USDA

United States
Department of
Agriculture

Forest Service

Tongass
National Forest

R10 – MB – 431
April 2001

Tongass National Forest

Annual Monitoring & Evaluation Report for Fiscal Year 2000

United States Department of Agriculture

Forest Service

Alaska Region
Tongass National Forest

648 Mission Street
Ketchikan, AK 99901
907-225-3101
FAX 907-228-6215

File Code: 1920/ 2500

Date: April 25, 2001

Dear Reader:

Your name is currently on our mailing list of those who are to receive the Tongass National Forest Annual Monitoring & Evaluation Reports. If you would like to receive the fiscal year 2001 report, which we will publish and mail in March 2002, please mark the appropriate blank below and return this form to our office by June 30, 2001.

Please note that persons or groups not returning this form will be deleted from the mailing list, and will no longer receive copies of the monitoring report.

This letter will serve as a Response Form for our mailing list. It includes a return address on the reverse side. Please tear out, fill in the information below, and return to our office in Sitka, Alaska.

You may also fax this form to Kathy Peterson at 907-747-4331, or e-mail a reply to kjpeterson@fs.fed.us

Sincerely,

John C Sherrod

JOHN C. SHERROD
Planning Staff Officer
Tongass National Forest

(Name) ______________________________

(Address) ______________________________

(City, State, Zip) ______________________________

_____ YES – Please send me the Tongass National Forest Year 2001 Monitoring & Evaluation Report.

_____ DO NOT send me the Tongass National Forest Year 2001 Monitoring & Evaluation Report. Please remove my name from your mailing list.

TEAR OUT AND RETURN

fold

USDA Forest Service
Tongass National Forest
204 Siginaka Way
Sitka, Alaska 99835

Attn: Kathy Peterson

fold

Tongass National Forest

Annual Monitoring & Evaluation Report for Fiscal Year 2000

U. S. Department of Agriculture, Forest Service
Tongass National Forest
Ketchikan, Alaska

April 2001

Table of Contents

Chapter 1

Setting the Context

Chapter 1
Setting the Context

Introduction

Chapter 1 is an overview of the past, present and desired conditions, in the context of the 1995 Montreal Process (MP) Criteria and Indicators (C&I) of sustainable management. The criteria relate specifically to forest conditions and functions, and to the values and benefits associated with the environmental and socio-economic goods and services provided by the forests.

It is essential that planners focus on sustainability, and that our uses of the forests today do not impair the functioning of ecological processes and the ability of these natural resources to contribute economically and socially into the future. 36 CFR 219.11 states "[The] annual monitoring and evaluation report ... must include ... (3) A description of the trend(s) toward achieving goals or desired conditions and sustainability...." It further states that "[a]chievement of ecological, social and economic sustainability is the overall goal for management of National Forest System land."

The December 2000 forest planning regulations (36 CFR 219) are designed to address and help ameliorate problems associated with a highly fragmented environment. The Montreal Process C&I framework provides a common language and unified measurement for improved communications between the various partners, and enables integration of social, economic and ecological factors into indicators of sustainability. The C&I do not substitute for, or undermine, following law and regulation, but are to be viewed as a "face" for sustainability and as a means of organizing large amounts of information.

The Montreal Process Criteria and Indicators are related to Tongass National Forest monitoring activities through the forest planning regulations (36 CFR 219), the October 2000 Forest Service Strategic Plan, and the Local Unit Criteria and Indicator Development project (LUCID). The Tongass National Forest Land and Resource Management Plan (TLMP) and the Monitoring and Evaluation (M&E) Plan establishes the strategic monitoring framework for the Tongass.

The C&I have seven criteria that address various elements of sustainability of forested lands. The criteria are:

I. Conservation of biological diversity.
II. Maintenance of productive capacities of ecosystems.
III. Maintenance of forest ecosystem health and vitality.
IV. Conservation and maintenance of soil and water resources.
V. Maintenance of forest contribution to global carbon cycles.
VI. Maintenance and enhancement of multiple socio-economic benefits to meet the needs of societies.
VII. Legal, institutional and economic framework for forest conservation and sustainable management

Description of Past and Present Management, and the Desired Condition

The discussion for each of the seven criteria is presented in three parts. The "Past" describes the historic perspective of management on the Tongass National Forest. The history of Tongass National Forest management is briefly described below, giving a general reference point for the discussion for each of the criteria.

The "Present" generally describes the current management direction and conditions. This can be related to the criteria through the Goals and Objectives for each of the 19 land use designations (LUD) in the TLMP.

The "Desired Condition" describes the future management condition desired for each of the 19 LUD's. In addition, desired conditions are somewhat embedded in the Forest-wide standards and guidelines in that the standards and guidelines are developed to protect or create a specific condition. The Desired Condition for each of the 19 LUD's is described in Table 1. The discussion for each Criteria and Indicator will not include the complete description of each of the Desired Conditions, but will list the land use designation abbreviation, which can be cross-referenced to Table 1 for the description.

Past Management History

The Organic Administration Act of 1897, the basis of the National Forest System, provided direction to "improve and protect" Federal forest lands. The Act also affirmed the intent to provide for sustainable protection and use of the forest reserves.

The "core" of the Tongass National Forest was the Alexander Archipelago Forest Reserve, created by proclamation on August 20, 1902, by President Theodore Roosevelt. A second national forest, the Tongass, came to life by proclamation on September 10, 1907. The Alexander Archipelago and the Tongass were combined into a single National Forest (the Tongass), totaling 6.8 million acres, on July 1, 1908. An additional 8.7 million acres was added, by the third proclamation concerning the Tongass, on February 16, 1909. The Alaska National Interest Lands Conservation Act (ANILCA) was the next (and last) major addition to the National Forest land base.

Early management on the Tongass National Forest focused primarily on small timber sales, mining, and investigations of timber trespass. Saw mills were generally small and local in nature. Several pulp operations were started over the years, but seldom lasted long. After the creation of Glacier Bay National Park, investigations were made to include additional portions of the Tongass in the National Park System; nothing came of these efforts. One notable conservation program made as a result of these investigations was the establishment of a wildlife preserve on Admiralty Island for the protection of brown bears. In the 1950's, several long-term, large-scale timber sale contracts were created to provide for the economic growth of Southeast Alaska. Formalized management plans were generally local in nature, and very broad and generalized in content.

The Multiple-Use Sustained-Yield Act (MUSYA) of 1960 reaffirmed the principals of sustainability for the broad spectrum of natural resources found on National Forest System lands. Multiple Use Plans were developed for areas of the Tongass NF, but were, again, fairly local in nature and fairly general. The National Environmental Policy Act of 1969 led to environmental assessments that addressed the environmental effects on ecological systems and natural resources. The passage of the National Forest Management Act of 1976 (NFMA), which amended the MUSY, directed that forests develop land and resource management plans that provided for multiple uses and sustained yield in accordance with the MUSYA. In addition, consideration of environmental components such as ecosystems and biological diversity were to be provided for in forest and project planning.

The immediate direct result of the NFMA was the development of the Tongass Land Management Plan (1979), the first completed forest resource plan in the nation. The 1979 TLMP was a basic plan that established four land use designations with broad management direction. Two of the land use designations identified very large areas to be managed in an unroaded condition (areas recommended for Wilderness designation, including the two National Monuments proclaimed in 1979, and areas to be managed to preserve primitive conditions). One element established in the 1979 TLMP was a monitoring

plan. The Alaska Regional Guide (1980) established specific standards and guidelines and other management direction for National Forest management. The direction in the Regional Guide better described the measures to be taken for the protection and management of the Tongass NF.

The Alaska National Interest Lands Conservation Act (1980) transferred large blocks of other Federal agency lands to the Tongass NF, established 14 Wilderness Areas, and congressionally affirmed the establishment of two National Monuments. These wildernesses were established to preserve unique ecosystems, assuring sustainability of the biological diversity found within these areas. The TLMP was amended in 1986 to incorporate these changes, as well as incorporate the direction in the Regional Guide.

The Tongass Timber Reform Act of 1990 (TTRA) amended the ANILCA, providing for additional protection of fish-producing streams, establishing five new wildernesses, and establishing 12 "LUD II" areas, which are to be managed in an essentially unroaded, primitive state to preserve their primitive conditions. The TLMP was amended in 1991 to incorporate the direction contained in the TTRA.

Revision of the TLMP was completed, and the Record of Decision (ROD) signed, in 1997. The revised forest plan included 19 land use designations or allocations, as well as detailed Forest-wide standards and guidelines guiding the management of the Forest. Among the 19 land use designations allocated in the new TLMP were Old-growth Habitat, Special Interest Areas, and Remote and Semi-remote Recreation. These allocations are intended to preserve the ecological characteristics of the areas, and to promote biodiversity through maintaining a mixture of habitats, at a variety of spatial scales, that are capable of supporting naturally occurring flora, fauna, and ecological processes. In addition, there are 22 sets of Forest-wide standards and guidelines that provide direction for the management of the Tongass National Forest. These include standards and guidelines for the management of air, beach and estuary fringe, riparian areas, soil and water, wetlands, and threatened, endangered and sensitive species.

A new Record of Decision was issued in 1999 in response to numerous appeals of the 1997 decision. In addition to the areas previously identified for "low impact management," the 1999 ROD established 18 "areas of special interest" to be managed in a primitive condition. These areas were either in the Remote or Semi-remote LUD's.

Montreal Process Criteria and Indicators

I. Conservation of Biological Diversity

Evaluation of biological diversity is achieved through examining ecological integrity. Ecological integrity is maintained through ecosystems diversity, species diversity, and genetic diversity at various spatial scales. Ecosystems diversity is evaluated in terms of vegetation types, vegetative structural classes, and protected areas, as well as habitat fragmentation/connectivity. Evaluation criteria for species and genetic diversity include the presence of selected and sensitive species/guilds, populations and reproductive success of indigenous species. Wilderness, National Monument, old-growth reserves, wild and scenic rivers, and Special Areas, as well as beach, estuary, and riparian buffers are maintained to protect rare, unique and representative species and features. This protection provides for both species and genetic diversity. Wildlife and fish species of special interest, including Management Indicator Species (MIS) and sensitive species, are monitored for population trends relative to habitat changes. The effect of fragmentation and connectivity on wildlife and fish species is determined by the relative locations of roads and harvest units to geomorphic and vegetative features. The presence of snags and in-stream coarse woody debris determine the effectiveness of the riparian buffer and stream channel condition on the maintenance of aquatic biological diversity.

1. Past

Past management activities were not necessarily designed to meet the objectives of this criteria. However, the vast area associated with the Tongass contributed heavily to the maintenance of the natural biodiversity; less than half of 1 percent of the total area has ever had any type of management activity. Management activities generally conformed to the applicable laws and

regulations, but until the NFMA and the1979 TLMP, no formal Forest-wide consideration of maintaining or improving biodiversity occurred.

2. Present

Management activities since 1979 have been guided by the 1979 land management plan, the 1980 Regional Guide, the 1990 amendment incorporating the Tongass Timber Reform Act, and now the direction and standards and guidelines included in the 1997 TLMP and 1999 ROD.

3. Desired Condition

See Table 1 below: WW, WM, NM, RA, SA, RM, MW, OG, SM, L2, WR, SR, RR, EF, SV, ML, TM

II. Maintenance of Productive Capacity of Forest Ecosystems

Productive capacity of forest ecosystems is achieved through maintaining ecosystem integrity and productivity of timber, and is evaluated in terms of the timber land base, forest type and age class, annual timber removal, and presence of invasive species detrimental to forest conditions. Evaluation criteria for productive capacity include distribution and changes in the timber land base, mean annual increment for forest type and age class, rate and total area of forest land converted to non-forest cover, area/volume of annual periodic timber removal and area and severity of occurrence of exotic species detrimental to forest condition.

1. Past

The principle management activity that relates to this criterion is timber harvest; from the 1950's to the 1990's, the vast majority of timber harvest was associated with the long-term timber sales. The only silvicultural system applied was clear cutting. Regeneration was almost entirely natural, and some precommercial thinning occurred. Major changes in timber sale planning began to come about in the 1970's with the passage of the NEPA and NFMA. Direction contained in the 1979 TLMP and Regional Guide changed both the ways of planning timber sales and the protection of other resources. Beginning in the 1980's more emphasis was put on thinning, and more thought given to future second growth management. The advent of the TTRA and the 1997 Forest Plan considerably changed the way the timber resource was managed. As stated above, considerably less than half of 1 percent is under any type of intensive management.

2. Present

Current management of the timber resource on the Tongass NF is dramatically different from even ten years ago. More emphasis is put on alternative silvicultural systems with an increasing emphasis on uneven-aged management, increased second growth management, consideration for non-timber resources, and coordination with other agencies and the public.

3. Desired Condition

See Table 1 below: RR, SV, ML, TM

III. Maintenance of Forest Ecosystem Health and Vitality

Ecosystem health and vitality is achieved through maintaining ecosystem integrity relative to selected physical and biologic indicators. Ecosystem health and vitality is evaluated in terms of principal ecological processes, effects of human activities, fire-water flow regimes, and invasion of noxious species. Evaluation criteria for ecosystem health and vitality include area and severity of insect attack and disease infestation, area of windthrow, area burned, and introduction of exotic species

detrimental to forest condition, as well as the total area of forest land converted to non-forest land cover and uses, and the rate of conversion.

1. Past

   Past management for forest health was primarily the salvage of windthrown or landslide/avalanche damaged trees. Wind damage is far more prevalent in Southeast Alaska than fire; fire is not a consideration. Wind damage has occurred to both natural stands and buffers left along streams, between units; many of these areas were not treated because of access or low value. Landslides are another naturally occurring destructive force; salvage rarely occurred because of the potential for additional soil and watershed damage. Insect and disease damage was not generally of a concern because of the relatively small area affected. Some treatment of easily accessible stands has occurred, but usually endemic levels of insect and disease activity were allowed to run their course. Insects were generally weather controlled, and outbreaks short-lived. Decays have caused small-scale disturbances, but treatment of these stands usually occurred only where readily accessible.

2. Present

   Management of forest health is little changed from the past. A major shift has been in the recognition of wind damage potential, and greater effort has been put into preventing wind damage caused by management activities. Although there has been a general increase in accessibility over the Forest, the increase in “no harvest” land use designations, the lessening emphasis on timber harvest, and the closing of existing roads will likely reduce access in the future. Nature events will be observed, but in all probability little insect- and disease-related management activity will occur.

3. Desired Condition

   See Table 1 below: WW, WM, NM, RA, SA, RM, MW, OG, SM, L2, WR, SR, RR, EF, SV, ML, TM

IV. Conservation and Maintenance of Soil and Water Resources

Conservation and maintenance of soil and water resources is achieved through maintaining ecosystem integrity relative to estimates of historical ranges of variability of ecological conditions. Evaluation of the conservation and maintenance of soil and water resources includes the percentage of harvested area showing degraded soil quality, ecologically sensitive areas along buffer zones, and assessment of changes in the distribution and abundance of native aquatic fauna. Soil quality parameters monitored include compaction, displacement, erosion, water ponding, and loss of organic matter. Specific measurements include stream flow characteristics and acres by watershed condition, defined through hydrologic condition assessment.

1. Past

   Past management activities, particularly timber harvest and road construction, have adversely affected the soil and water resource. Changes in thinking over the years have led to an improvement of these resources. The NEPA and NFMA legislated changes in the way business was done, and greater effort was put into protection and rehabilitation of the soil and water resources. The Regional Guide contained specific standards and guidelines for the protection of the watershed resources. The Clean Water Act mandated the use of Best Management Practices (BMP), which were incorporated into the timber sale contract, and applied to road construction as well as mining activities. The passage of the TTRA directly affected the aquatic resource on the Tongass through the mandated increase in the size of riparian buffers.

2. Present

Present management activities are heavily oriented toward the maintenance and improvement of the soil and water resources. The continuing use of the BMP's, the application of the TLMP standards and guidelines, the increased coordination with soil-and water-related agencies, and the increased use of watershed assessments have strongly contributed to a great reduction of adverse effects on the soil and water resources as a result of management activities. In addition, much more emphasis is placed on watershed restoration and rehabilitation.

3. Desired Condition

See Table 1 below: WW, WM, NM, RA, SA, RM, MW, OG, SM, L2, WR, SR, RR, EF, SV, ML, TM

V. Maintenance of Forest Contribution to Global Carbon Cycles

The maintenance of a Forest's contribution to the global carbon cycle is based on the total forest ecosystem biomass and carbon pool, by forest type, age class and successional stages. This includes absorption and release of carbon, and the contribution of forest products to the total global budget.

Carbon cycle contributions by the Tongass National Forest are not evaluated in this report.

VI. Maintenance and Enhancement of Long-Term Multiple Socioeconomic Benefits

Maintenance and enhancement of long-term multiple socioeconomic benefits is achieved through maintaining a sustainable yield and production of goods and services, and maintenance of social values. Maintenance and enhancement of socioeconomic benefits are evaluated in terms of demographics, opportunities to provide socioeconomic benefits to communities, financial benefits to communities, financial and opportunity cost, as well as the presence of natural resources and capital investment. Specific aspects tracked include production and consumption, recreation and tourism, investment in the forest sector, cultural/social/spiritual needs/values, and employment and community needs. Criteria for evaluation of the maintenance and enhancement of long-term multiple socioeconomic benefits include area/volume of timber removed, expenditures by individuals on non-timber use, availability and use of recreational opportunities, funding for forest management and research, harvest revenues, protection of unique or significant aboriginal social, cultural or spiritual sites, employment of local populations in forest management, number of communities with a significant forestry component in the economic base, area of land available for subsistence opportunities, and providing potable water sources.

1. Past

The tourism industry was started early in Southeast Alaskan history. For example, the first cruise ships visited Hubbard Glacier, near Yakutat, in 1883 and grew dramatically in the early years of the twentieth century. A thriving industry was built around the commercial sale of contemporary Native Alaskan artifacts. Tourism has continued to grow ever since, and is intimately tied to the Tongass National Forest. The sheer presence of the forest is a major draw for tourists, ranging from cruise ships to hikers in the wilderness areas and users of Forest Service cabins. The fish, originating in the waters within and adjacent to the National Forest, are a significant attraction for tourists, creating a viable industry in charter boating. The boom in eco-tourism has increased the importance of tourism to the Southeast Alaska economics base.

Recreation opportunities have continued to grow, and are as varied as kayak trips, hiking, camping, hunting, birding, off-roading, boating, snowmobiling, and camping at Forest Service facilities such as cabins, shelters, and developed recreation areas. The presence of the several wilderness areas attracts many people each year. Several businesses are based on both terrestrial and aquatic wildlife viewing, ranging from brown bears to birds to whales.

Commercial fishing has long been a feature of the economic base in Southeast Alaska. Many of the fish caught originated in the waters of the National Forest, or are present because of habitat enhancement programs on the Forest. There were many fish processors located throughout Southeast Alaska, with some very large canneries. These processors and canneries existed from the late 1800's to the present, although the numbers have diminished over the years. The numbers of commercial fishing boats operating in Southeast Alaska have increased over the years, with a dramatic increase over the last 10 years.

In the early years of the twentieth century, there were hopes for a pulp mill operation because of the suitability of the timber for making pulp. In 1920, a series of sales were studied; this led to two of the sales being offered in 1921. Ultimately, both failed, and a third company lost interest. The large cost of transport to available markets was the primary factor. Other pulp and sawtimber sales made in the late 1920's failed because of the onset of the Great Depression. Most early saw mills were generally small and local in nature. Many of the same problems (cost of transport, lack of an infrastructure, and a lack of local markets) have persisted throughout the years.

The 1950's brought several long-term, large-scale timber sale pulpwood/sawlog contracts, which were created to provide for the economic growth and community stability of Southeast Alaska. There were originally five contracts, which were eventually reduced to two. Ketchikan Pulp Company was formed by a combination of American Viscose and Puget Sound Pulp and Timber in 1948. A mill site was selected at Ward Cove near Ketchikan, and a 50-year contract was signed in 1951. A second pulp mill was built in Sitka by the Alaska Pulp Development Company, and went into operation in 1959. Timber harvesting was maintained at a relatively constant level until the early 1990's; it has since been greatly reduced through a variety of factors, including major changes in the management of the National Forest.

The long-term contract with Alaska Pulp Company was terminated in 1993. The other long-term contract with Ketchikan Pulp Corporation terminated in 1999. The mill closures brought about many social and economic effects in Southeast Alaska. Among these were reductions in property tax bases, reductions in school enrollments, and major shifts in the private sector employment, with tourism and fishing taking on a much larger role. While surveys show that the average wage has remained close to the same as before the mill closures, they also show that more people are required to work two jobs to maintain the same level of pay. A much larger percentage of the employment is in the service industries, and Federal, State and local governments.

2. <u>Present</u>

The present situation continues to place less emphasis on the consumptive use of forest products, such as timber and minerals extraction, and more on the fishing and tourism industries. The timber industry, at present, is in a slump; the possibility of further reductions in the Federal timber management program may reduce the industry to a position of only local effect and interest. The probability of timber once again becoming a "major player" in the overall socioeconomic environment in Southeast Alaska is considered low. Mining is becoming more important than it was just a few years ago; however, the economic effects are fairly localized. Greater emphasis is put in recreation, tourism, cultural uses of the land, and cooperative efforts to develop alternative uses of forest resources. A growing industry revolves around the culture of Native Alaskans.

3. <u>Desired Condition</u>

See Table 1 below: WW, WM, NM, RA, SA, RM, MW, OG, SM, L2, WR, SR, RR, EF, SV, ML, TM, MM, TUS

VII. Legal, Institutional and Economic Framework for Forest Conservation and Sustainable Management

Effectiveness of the legal, institutional and economic framework for forest conservation and sustainable management is determined through evaluation of the support toward conservation and sustainable management of the forest, economic policies and measures, capacity to measure and monitor changes in the conservation and sustainable management, and capacity to conduct and apply research/development focused on improving forest management and delivery of goods/services. Evaluation criteria for the application of the legal, institutional and economic framework for forest conservation and sustainable management include: access to forest resources, ownership, effectiveness of inter-institutional coordination on land use and forest management, performance accomplishment, effective monitoring and control system audits for management conformity with planning, harvest system prescriptions, mechanisms for sharing the economic benefits derived from forest management, relevance of policy and planning information, and status of inventories relative to updates.

1. Past

The legal framework for forest conservation and sustainable management is rooted in the very beginnings of the Forest Reserves. The Creative Act of 1891 withdrew the forest reserves from the public domain. The purpose of the forest reserves was to protect and manage the forest resources for sustained production of goods and services into the future. In 1897, the Organic Act established the national forests, and gave direction to "improve and protect" Federal forest lands.

Four key pieces of legislation guide the management of the Tongass National Forest and the sustainability of forest resources. The first is the Multiple Use-Sustained Yield Act of 1960. The MUSY affirmed the authority of the Forest Service to manage the national forests and grass lands for "outdoor recreation, range, timber, watershed, and wildlife and fish purposes." Through this act, Congress affirmed the philosophies and principles of sustainability to all the resources under the management and responsibility of the Forest Service.

The second is the National Environmental Policy Act of 1969 (NEPA), which was enacted to "promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man" and "enrich the understanding of ecological systems and natural resources." The NEPA directs that for all Federal actions that significantly affect the quality of the human environment, the environmental effects of the action are to be documented, and alternatives to proposals are to be displayed and evaluated.

The third key act is the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA). The RPA called for a five-year review of all Forest Service activities, based on an assessment of renewable resources completed every 10 years.

The RPA was amended with the National Forest Management Act of 1976 (NFMA), the fourth key law. The NFMA mandated the used of land management plans to guide the management of the national forests in a manner that provides for multiple use and sustained uses. The plans were to be developed and maintained through "integrated consideration of physical, biological, economic and other sciences."

Management of the Tongass was directly affected by passage of the Alaska National Interest Lands Conservation Act of 1980. The ANILCA increased the size of the Tongass NF, established 14 Wilderness Areas, and affirmed the establishment of two National Monuments. These wildernesses and monuments were established to preserve unique ecosystems, assuring sustainability of the biological diversity found within these areas. In addition, the ANILCA directs that, consistent with good management principles and conservation practices, activities on [federal] public lands in Alaska will be conducted to cause the least effect on the subsistence lifestyles of Alaskan rural residents. The Tongass Timber Reform Act of 1990 (TTRA) amended the ANILCA, providing for identification of lands unsuitable for timber management, increasing

protection of fish-producing streams, establishing five new wildernesses, and establishing 12 "LUD II" areas, which are to be managed in an essentially unroaded state to preserve their primitive conditions.

Many other laws have been passed to protect, maintain or enhance all of the forest resources, including the social and cultural resources. These laws include:

Weeks Law of 1911 – authorized the purchase of lands within the watersheds of navigable streams;

Knutson-Vandenberg Act (1930) – authorized the collection of funds from timber sale receipts for the purpose of "protecting and improving the productivity of the renewable resources of the forest land ... including sale area improvement, maintenance and construction, reforestation, and wildlife habitat management";

Clean Water Act of 1948, as amended – provides for a variety of measures to preserve water quality, including the mandate to develop Best Management Practices;

Wilderness Act of 1974 – established the national wilderness preservation system for the purpose of preserving relatively large tracts of land which appear unaffected by human activity, has outstanding opportunities for solitude or a primitive type of recreation, and may contain ecological, geological, or other features of scientific, educational, scenic, or historic value";

National Historic Preservation Act (1966) – required Federal agencies to take a bigger role in historic preservation programs and activities;

Wild and Scenic Rivers Act (1968) – declared that selected rivers which possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or similar values be preserved in their free-flowing state;

Endangered Species Act of 1973 (ESA) – directed that Federal agencies "shall seek to conserve threatened and endangered species";

Archaeological Resources Protection Act of 1979 – directed Federal agencies to protect archaeological and cultural resources and sites on [federal] public lands;

Federal Cave Resources Act of 1988 – provides for protection of significant cave resources on Federal lands; and

Forest Stewardship Act of 1990 – established a grant program for the study of biology of forest organisms, ecosystems functions, and wood as a raw material, among others. Also provided increased service to rural communities through rural development programs.

In addition to the myriad of laws, other national direction comes from Executive Orders. Executive Orders of interest that address protection and maintenance of forest resources (such as natural, socioeconomic and cultural resources) include EO 11988 Floodplain Management (1977), EO 11990 Protection of Wetlands (1977), 12898 Environmental Justice (1994), EO 12962 Recreational Fisheries (1995), and EO 13186 Migratory Bird Protection (2000).

The various regulations, manuals, and handbooks provide the management philosophies, polices, principles, and direction for the implementation of the laws and Executive Orders.

2. Present

The present management is continue to follow all applicable laws, Executive Orders, and regulations in the management of the Tongass National Forest, and to continue to make adaptive changes to integrate old and new laws and regulations as they become effective.

3. Desired Condition

The legal framework for management of the forest resources of the Tongass National Forest applies across the full spectrum of resources. The Desired Conditions for all land use allocations are tied to this legal framework, and will conform to the applicable laws, regulations, policies, and direction.

Table 1. Relationship between Forest Plan Desired Conditions and Criteria Indicators

Desired Condition	Criteria Indicators						
	Conservation of Biological Diversity	Maintenance of Productive Capacity of Forest Ecosystems	Maintenance of Forest Ecosystem Health & Vitality	Conservation and Maintenance of Soil & Water Resources	Maintenance of Forest Contribution to Global Carbon Cycles	Maintenance & Enhancement of Long Term Multiple Socioeconomic Benefits	Legal, Institutional & Economic Framework for Forest Conservation & Sustainable Management
WW, WM - Wilderness, Wilderness National Monument Extensive, unmodified natural environments characterize all designated Wilderness on the Tongass National Forest. Ecological processes and natural conditions are not measurably affected by past or current human uses or activities. Users have the opportunity to experience independence, closeness to nature, solitude and remoteness, and may pursue activities requiring self-reliance, challenge and risk. Motorized and mechanized use is limited to the minimum needed for the administration of the wilderness, access to state and private lands, subsistence uses, and for public access and other uses specifically allowed by ANILCA. The purposes of National Monument designation are fulfilled by protecting and learning more about the special resources they contain. Appropriate research is encouraged and supported within the constraints of wilderness designation, and contributes to both the purposes of the Wilderness National Monuments and improved management of other forest lands. Appropriate interpretive and educational efforts allow the public to better understand the resources of these special areas and to appreciate how these areas fit into the local, regional, and even global context of geology, ecology, and human history. The Wilderness portions of Admiralty Island and Misty Fiords National Monuments have the same characteristics and desired conditions as other Wildernesses on the Forest.	X		X	X		X	
NW - Nonwilderness National Monument The purposes of the Nonwilderness National Monument designation is the same as that for the Wilderness. Ultimately, the entire Nonwilderness National Monument provides the same natural settings and recreation experiences as the adjacent Wilderness National Monument areas. However, activities, such as mining, are permitted that are not allowed in Wilderness. During mining operations, mining activities are localized and limited to the area necessary for their efficient and orderly development. Off-site effects to National Monument resources are minimal, and most Monument users are not aware of, or affected by, the mines. After the completion of mining, rehabilitation of the affected areas is done to minimize the evidence of past mining and to the maximum extent feasible, seek to return the area to generally natural conditions.	X		X	X		X	

Desired Condition	Criteria Indicators: Conservation of Biological Diversity	Maintenance of Productive Capacity of Forest Ecosystems	Maintenance of Forest Ecosystem Health & Vitality	Conservation and Maintenance of Soil & Water Resources	Maintenance of Forest Contribution to Global Carbon Cycles	Maintenance & Enhancement of Long Term Multiple Socioeconomic Benefits	Legal, Institutional & Economic Framework for Forest Conservation & Sustainable Management
RA - Research Natural Area All Research Natural Areas on the Tongass National Forest are characterized by essentially unmodified environments in which natural ecological processes prevail. They remain undisturbed by human uses or activities, and provide quality opportunities for non-manipulative scientific research, observation and study. The RNA network is representative of the predominant vegetation types, wildlife habitats, and aquatic communities of the Tongass. Research Natural Areas are used as monitoring reference areas to evaluate other lands where management activities are undertaken to assess the effectiveness of various standards, guidelines, and mitigation measures in reducing or preventing adverse environmental effects.	X		X	X		X	
SA - Special Interest Area All Special Interest Areas on the Tongass National Forest are characterized by generally unmodified environments in which unique natural features are preserved. They remain largely undisturbed by human uses or activities, except for localized interpretive purposes and, in some cases, recreation developments, and provide quality opportunities for public study, use, and enjoyment. Each is an example of one or more cultural, geological, botanical, zoological, paleontological, or other special features unique within the Tongass.	X		X	X		X	
RM - Remote Recreation Areas in the Remote Recreation Land Use Designation are characterized by extensive, unmodified natural environments. Ecological processes and natural conditions are not noticeably affected by past or current human uses or activities. Users have the opportunity to experience independence, closeness to nature, solitude and remoteness, and may pursue activities requiring self-reliance in an environment that offers a high degree of challenge and risk. Interactions between users are infrequent. Motorized access is limited to traditional means: boats, aircraft and snowmachines. Facilities and structures are minimal, and rustic in appearance.	X		X	X		X	
MW - Municipal Watershed Lands managed as Municipal Watersheds are generally in a natural condition. Facilities or structures to provide municipal water supplies may be present. Uses or activities that could adversely affect water quality or supply do not occur. These watersheds provide municipal water that meets all State Drinking Water Regulations and Water Quality Standards for water supply.	X		X	X		X	

Desired Condition	Criteria Indicators						
	Conservation of Biological Diversity	Maintenance of Productive Capacity of Forest Ecosystems	Maintenance of Forest Ecosystem Health & Vitality	Conservation and Maintenance of Soil & Water Resources	Maintenance of Forest Contribution to Global Carbon Cycles	Maintenance & Enhancement of Long Term Multiple Socioeconomic Benefits	Legal, Institutional & Economic Framework for Forest Conservation & Sustainable Management
OG - Old-growth Habitat All forested areas within this Land Use Designation have attained old-growth forest characteristics. A diversity of old-growth habitat types and associated species and subspecies and ecological processes are represented.	X		X	X		X	
SM - Semi-remote Recreation Areas in the Semi-remote Recreation Land Use Designation are characterized by generally unmodified natural environments. Ecological processes and natural conditions are only minimally affected by past or current human uses or activities. Users have the opportunity to experience a moderate degree of independence, closeness to nature, solitude and remoteness, with some areas offering motorized opportunities and others non-motorized opportunities (except for the traditional uses of boats, aircraft, and snowmachines). Interactions between users are infrequent. Facilities and structures may be minimal or occasionally may be larger in scale, but will be rustic in appearance, or in harmony with the natural setting.	X		X	X		X	
L2 - Land Use Designation II Areas in this Land Use Designation are characterized by extensive, generally unmodified natural environments, and retain their wildland character. Ecological processes and natural conditions are only minimally affected by past or current human uses or activities. Users have the opportunity to experience a high-to-moderate degree of independence, closeness to nature, solitude and remoteness and may pursue activities requiring self-reliance, challenge, and risk. Interactions between users are infrequent. Recreational facilities and structures are primitive.	X		X	X		X	
WR - Wild River Wild Rivers and river segments are in a natural, free-flowing, and undisturbed condition. Ecological processes and changes predominate. The outstandingly remarkable values for which the river was designated remain outstanding and remarkable. Recreation users have the opportunity for primitive and semi-primitive experiences, solitude and remoteness in a natural setting. Interactions between users are infrequent, and evidence of human activities is minimal. Facilities and structures are rustic in appearance and promote primitive recreation and tourism experiences.	X		X	X		X	

Desired Condition	Criteria Indicators						
	Conservation of Biological Diversity	Maintenance of Productive Capacity of Forest Ecosystems	Maintenance of Forest Ecosystem Health & Vitality	Conservation and Maintenance of Soil & Water Resources	Maintenance of Forest Contribution to Global Carbon Cycles	Maintenance & Enhancement of Long Term Multiple Socioeconomic Benefits	Legal, Institutional & Economic Framework for Forest Conservation & Sustainable Management
SR - Scenic River Scenic Rivers and river segments are in a generally unmodified, free-flowing condition. Ecological processes and changes may be somewhat affected by human uses. The outstandingly remarkable values for which the river was designated remain outstanding and remarkable. Recreation and tourism users have the opportunity for experiences ranging from Primitive to Roaded Natural in a natural-appearing setting. Resource activities within the river corridor are not visually evident to the casual observer. Interactions between users are moderate. Facilities and structures are rustic in appearance, and promote semi-primitive recreation experiences and/or public safety. A yield of timber may be produced which contributes to the Forest-wide sustained yield.	X	X	X	X		X	
RR - Recreational River Recreational Rivers and river segments are in a generally unmodified to modified, essentially free-flowing condition. Ecological processes and changes may be affected by human uses. The outstandingly remarkable values for which the river was designated remain outstanding and remarkable. Recreation users have the opportunity for a variety and range of experiences in a modified but pleasing setting. Resource activities and developments may be present within the river corridor, and may dominate some areas. A variety of visual conditions occur. Interactions between users may be moderate to high. A yield of timber may be produced which contributes to Forest-wide sustained yield.	X	X	X	X		X	
EF - Experimental Forest Each experimental forest is managed for the purposes for which it was established. Ongoing research provides useful needed information for forest management. Non-research types of activities and uses may be compatible, and do not interfere with, research or demonstration objectives. Opportunities for public use of roads may be present.	X		X	X		X	

Desired Condition	Criteria Indicators						
	Conservation of Biological Diversity	Maintenance of Productive Capacity of Forest Ecosystems	Maintenance of Forest Ecosystem Health & Vitality	Conservation and Maintenance of Soil & Water Resources	Maintenance of Forest Contribution to Global Carbon Cycles	Maintenance & Enhancement of Long Term Multiple Socioeconomic Benefits	Legal, Institutional & Economic Framework for Forest Conservation & Sustainable Management
SV - Scenic Viewshed In areas managed under the Scenic Viewshed Land Use Designation, forest visitors, recreationists, and others using identified popular travel routes and use areas will view a natural-appearing landscape. Management activities in the foreground will not be evident to the casual observer. Activities in the middleground and background will be subordinate to the characteristic landscape. Areas topographically screened from Visual Priority Travel Routes and Use Areas may be heavily modified. Within these viewsheds, timber harvest units are typically small and affect only a small percentage of the seen area. At any given point in time, roads, facilities, and other structures are either not visually evident or are subordinate to the landscape. A variety of successional stages providing wildlife habitat occur, although late successional stages predominate. Recreation and tourism opportunities in a range of settings are available. In the areas managed for Retention or Partial Retention VQO's, timber yields will generally be obtained through the use of small openings or uneven-aged systems. A yield of timber is produced which contributes to Forest-wide sustained yield.	X	X	X	X		X	
ML - Modified Landscape In areas managed under the Modified Landscape Land Use Designation, forest visitors, recreationists, and others using popular travel routes and use areas will view a somewhat modified landscape. Management activities in the visual foreground will be subordinate to the characteristic landscape, but may dominate the landscape in the middle and backgrounds. Within the foreground, timber harvest units are typically small and affect only a small percentage of the seen area at any one point in time. Roads, facilities, and other structures are also subordinate to the foreground landscape. Recreation opportunities associated with natural-appearing to modified settings are available. A variety of successional stages provide a range of wildlife habitat conditions. A yield of timber is produced which contributes to Forest-wide sustained yield.	X	X	X	X		X	
TM - Timber Production Suitable timber lands are managed for the production of sawtimber and other wood products on an even-flow, Long-term Sustained Yield basis; the timber yield produced contributes to a Forest-wide sustained yield. An extensive road system provides access for timber management activities, recreation uses, hunting and fishing, and other public and administrative uses; some roads may be closed, either seasonally or year-long, to address resource concerns. Management activities will generally dominate most seen areas. Tree stands are healthy and in a balanced mix of age classes from young stands to trees of harvestable age, often in 40- to 100-acre stands. Recreation opportunities, associated with roaded settings from Semi-primitive to Roaded Modified, are available. A variety of wildlife habitats, predominantly in the early and middle successional stages, are present.	X	X	X	X		X	

Desired Condition	Criteria Indicators: Conservation of Biological Diversity	Maintenance of Productive Capacity of Forest Ecosystems	Maintenance of Forest Ecosystem Health & Vitality	Conservation and Maintenance of Soil & Water Resources	Maintenance of Forest Contribution to Global Carbon Cycles	Maintenance & Enhancement of Long Term Multiple Socioeconomic Benefits	Legal, Institutional & Economic Framework for Forest Conservation & Sustainable Management
MM - Minerals During mining operations, mining activities are limited to the area necessary for their efficient, economic, and orderly development. Mining is carried out so that any effects on other resources are minimized to the extent feasible, and all minimum legal resource protection requirements are met. Other resource uses and activities in the area do not conflict with mining operations. After the completion of mining, affected areas are rehabilitated and, in most cases, the area once again provides the settings and opportunities of the original Land Use Designation.		X				X	
TUS - Transportation & Utility System Transportation and Utility Systems have been constructed in an efficient and economic manner, and have been designed to be compatible with the adjacent Land Use Designation to the maximum extent feasible. The minimum land area consistent with an efficient, safe facility is used for their development. Effects on other resources have been recognized and resource protection has been provided. Other resources uses and activities in the area do not conflict with utility operations. State and Federal highways and reservoirs offer new developed recreation opportunities, as appropriate.							

The USDA Forest Service's

Integrity and Accountability:

MISSION: To Sustain the Health, Diversity and Productivity of the Nation's

GOALS

Ecosystem Health

Promote ecosystem health and conservation using a collaborative approach to sustain the Nation's Forests, grasslands and watersheds.

Multiple Benefits to People

Provide a variety of uses, values, products and services for present and future generations by managing within the capability of sustainable ecosystems.

OBJECTIVES

Objective 1.a—Improve and protect watershed conditions to provide the water quality and quantity and the soil productivity necessary to support ecological functions and intended beneficial water uses.

Objective 1.b—Provide ecological conditions to sustain viable populations of native and desired nonnative species and to achieve objectives for Management Indicator Species (MIS)/focal species.

Objective 1.c—Increase the amount of forests and grasslands restored to or maintained in a healthy condition with reduced risk and damage from fires, insects and diseases, and invasive species.

Objective 2.a—Improve the capability of the Nation's forests and grasslands to provide diverse, high-quality outdoor recreation opportunities.

Objective 2.b—Improve the capability of wilderness and protected areas to sustain a desired range of benefits and values.

Objective 2.c—Improve the capability of the Nation's forests and grasslands to provide desired sustainable levels of uses, values, products, and services.

Objective 2.d—Increase accessibility to a diversity of people and members of underserved and low-income populations to the full range of uses, values, products, and services.

Objective 2.e—Improve delivery of services to urban communities.

Strategic Plan Framework

A Framework for Natural Resource Management

Forests and Grasslands to Meet the Needs of Present and Future Generations

GOALS

Scientific and Technical Assistance

Develop and use the best scientific information available to deliver technical and community assistance and to support ecological, economic, and social sustainability.

Effective Public Service

Ensure the acquisition and use of an appropriate corporate infrastructure to enable the efficient delivery of a variety of uses.

OBJECTIVES

Objective 3.a—Better assist in building the capacity of Tribal governments, rural communities, and private landowners to adapt to economic, environmental, and social change related to natural resources.

Objective 3.b—Increase the effectiveness of scientific, developmental, and technical information delivered to domestic and international interests.

Objective 3.c—Improve the knowledge base provided through research, inventory, and monitoring to enhance scientific understanding of ecosystems, including human uses, and to support decisionmaking and sustainable management of the Nation's forests and grasslands.

Objective 3.d—Broaden the participation of less traditional research groups in research and technical assistance programs.

Objective 4.a—Improve financial management to achieve fiscal accountability.

Objective 4.b—Improve the safety and economy of USDA Forest Service roads, trails, facilities, and operations and provide greater security for the public and employees.

Objective 4.c—Improve and integrate informational systems, data structures, and information management processes to support cost-efficient program delivery.

Objective 4.d—Improve the skills, diversity, and productivity of the workforce.

Objective 4.e—Ensure equal opportunity in employment practices.

Objective 4.f—Provide appropriate access to National Forest System lands and ensure nondiscrimination in the delivery of all USDA Forest Service programs.

Table: Tongass Monitoring Questions/ USDA Forest Service Strategic Goals Crosswalk

Tongass Monitoring Questions	*Goal 1: Ecosystem Health*	*Goal 2: Multiple Benefits to People*	*Goal 3: Scientific and Technical Assistance*	*Goal 4: Effective Public Service*
Air Quality				
Is air quality meeting State and Federal ambient air quality standards?	X			
Biodiversity				
Are contiguous blocks of old growth habitat being maintained in a forest-wide system of old growth reserves to support viable and well distributed populations of old growth associated species and subspecies?	X			
Are the effects on biodiversity consistent with those estimated in the Forest Plan?	X			
Are management practices consistent with current knowledge regarding sensitive species conservation (federally listed threatened or endangered species, Alaska Region sensitive species, and State species of special concern)?	X			
Are destructive insect and disease organisms increasing to potentially damaging levels following management activities?	X			
Fish Habitat				
Are population trends for Management Indicator Species (MIS) and their relationship to habitat changes consistent with expectations?	X			
Are fish & riparian standards and guidelines being implemented?	X			
Are fish & riparian standards and guidelines effective in maintaining or improving fish habitat?	X			
Heritage Resources				
Are heritage resources standards and guidelines being implemented?		X		
Are heritage resources standards and guidelines effective in protecting heritage/cultural resources as expected in the Forest Plan?		X		

Tongass Monitoring Questions	*Goal 1: Ecosystem Health*	*Goal 2: Multiple Benefits to People*	*Goal 3: Scientific and Technical Assistance*	*Goal 4: Effective Public Service*
Karst and Caves				
Are karst and cave standards and guidelines being implemented?	X			
Are karst and cave standards and guidelines effective in protecting the integrity of significant caves and the karst landscape?	X			
Land Management Planning				
Is the management of National Forest System lands consistent with management objectives of adjacent lands and their management plans?		X		
Local and Regional Economies				
Are the effects on employment and income similar to those estimated in the Forest Plan?		X		
Has the Forest Service worked with local communities to identify and pursue Rural Community Assistance opportunities?			X	
Minerals and Geology				
Are the effects of mining activities on surface resources consistent with Forest Plan expectations, as allowed in approved Plans of Operations?	X			
Recreation and Tourism				
Are areas of the Forest being managed in accordance with the prescribed Recreation Opportunity Spectrum (ROS) class in Forest-wide standards and guidelines?		X		
Is Off Road Vehicle (ORV) use causing, or will it cause, considerable adverse effects on soil, water, vegetation, fish and wildlife, visitors or cultural and historic resources of the Forest?	X			
Research				
Have identified high-priority information needs been fulfilled?			X	

Tongass Monitoring Questions	*Goal 1: Ecosystem Health*	*Goal 2: Multiple Benefits to People*	*Goal 3: Scientific and Technical Assistance*	*Goal 4: Effective Public Service*
Scenery				
Are the standards and guidelines effective in attaining the adopted Visual Quality Objectives established in the Plan?		X		
Soil and Water				
Are the standards and guidelines for soil disturbance being implemented?	X			
Are the standards and guidelines effective in meeting Alaska Regional Soil Quality Standards?	X			
Are Best Management Practices being implemented?	X			
Are Best Management Practices effective in meeting water quality standards?	X			
Subsistence				
Are the effects of management activities on subsistence users in rural Southeast Alaska communities consistent with those estimated in the Forest Plan?		X		
Timber				
Are timber harvest activities adhering to applicable timber management standards and guidelines?		X		
Are harvested Forest lands restocked within five years following harvest?		X		
Is the Allowable Sale Quantity (ASQ) consistent with resource information and programmed harvest?		X		
Are the Non-Interchangeable Components (NIC) of the allowable sale quantity consistent with actual harvest?		X		
Is the proportional mix of volume in NIC I and NIC II as estimated in the Forest Plan accurate?		X		
Should maximum size limits for harvested areas be continued?		X		
Transportation				
Are the standards and guidelines used for forest development roads and Log Transfer Facilities effective in limiting the environmental effects to anticipated levels?	X			

Tongass Monitoring Questions	*Goal 1: Ecosystem Health*	*Goal 2: Multiple Benefits to People*	*Goal 3: Scientific and Technical Assistance*	*Goal 4: Effective Public Service*
Wetlands				
Are wetlands standards and guidelines being implemented?	X			
Are wetlands standards and guidelines effective in minimizing the impacts to wetlands and their associated functions and values?	X			
Wild and Scenic Rivers				
Are Wild, Scenic, and Recreational River standards and guidelines being implemented?		X		
Are Wild, Scenic, and Recreational River standards effective in maintaining or enhancing the free flowing conditions and outstandingly remarkable values at the classification level for which the river was found suitable for designation as part of the National Wild and Scenic River System?		X		
Wilderness Areas				
Are standards and guidelines for the management of wilderness being implemented?		X		
Are standards and guidelines for the management of wilderness effective in maintaining the wilderness resource?		X		
Wildlife				
Are population trends for Management Indicator Species (MIS) and their relationship to habitat changes consistent with expectations?	X			
Are the population levels and associated distribution of mammalian endemic species on islands and portions of the mainland consistent with the estimates in the Forest Plan?	X			
Costs and Outputs				
What outputs were produced in the previous year?		X		
Are the costs associated with carrying out the planned management prescriptions (including those of producing outputs) consistent with those costs estimated in Plan?				X

Chapter 2

Monitoring Results

Chapter 2
Monitoring Results

Air Quality

Goal: Maintain the current air resource condition to protect the Forest's ecosystems from on- and off-Forest air emissions sources.

Objective: Attain national and State ambient air quality standards Forest-wide.

Background: Air quality is addressed Forest-wide, but the actual monitoring takes place at one or more monitoring sites within local air sheds where there are known or suspected air quality problems. Refer to "Juneau Air Quality Monitoring Project, Mendenhall Valley Data Summary, January 1985 – December 1995," published by the Alaska Department of Environmental Conservation, January 31, 1996.

Air Quality Question: Is air quality meeting State and Federal ambient air quality Standards?

The Tongass National Forest summarizes ambient air quality monitoring data the Alaska Department of Environmental Conservation (ADEC) has collected and analyzed in accordance with the Code of Federal Regulations (40 CFR Part 50). This data is stored in the Environmental Protection Agency's (EPA) Aerometric Information Retrieval System (AIRS) database, which is available to the public at http://www.epa.gov/airsdata/monreps.htm on the internet.

ADCE's monitoring strategy is to focus its limited resources on the highest priority areas and pollutants (i.e., areas and pollutants most likely to exceed a public health standard). For Southeast Alaska, ADEC has focused most of its efforts during the 1990's on monitoring particulate matter in Juneau's Mendenhall Valley. Particulate matter less than or equal to 10 micrometers, or PM_{10} is measured in micrograms per cubic meter (ug/m^3). There are two standards for PM_{10}: 150ug/m^3, measured as a 24-hour average; and 50ug/m^3, measured as an annual average.

A new standard of particulate matter less than or equal to 2.5 micrometers, or $PM_{2.5,}$ is also measured in micrograms per cubic meter (ug/m^3). The two standards for $PM_{2.5}$ are: 65ug/m^3 measured as a 24-hour average; and 15.0 ug/m^3, measured as an annual average.

Monitoring Results

During 2000, the highest reported 24-hour value for PM_{10} in the Mendenhall Valley was 37 ug/M^3, which is 25 percent of the standard. The second, third, and fourth highest 24-hour values were 29, 29, and 22 ug/m^3, respectively. The annual average to 1999, based on a total of 53 observations, was 9.3 ug/m^3. The last time the PM_{10} standards in Mendenhall Valley were exceeded was in 1993, when the three highest values were 313, 224, and 169ug/m^3.

No values for $PM_{2.5}$ were available.

Evaluation of Results

Although the Mendenhall Valley (including about 5,000 acres of Tongass National Forest land) is officially listed as a non-attainment area for PM-10, there were no exceedances of either PM-10 standard on or adjacent to the Tongass National Forest during the five-year period from 1996 to 2000. The City and Borough of Juneau's control strategy, including its wood smoke control program, and its road paving projects appear to be working.

Thus assuming ADEC's monitoring strategy is sound and the data stored in EPA's AIRS database is reliable, the answer to this monitoring question is: yes, air quality is meeting state and federal air quality standards.

Therefore, we recommend no corrective action with respect to air quality on the Tongass National Forest at this time. We also recommend the Tongass Monitoring Plan be amended to change the sampling methods for Air Quality from "annually summarize and evaluate available information..." to "every five years summarize and evaluate information from the State Department of Environmental Conservation and the U.S. Environmental Protection Agency."

Biodiversity

Goal: Maintain healthy forest ecosystems; maintain a mix of habitats at different spatial scales (i.e., site, watershed, island, province, and forest) capable of supporting the full range of naturally occurring flora, fauna, and ecological processes native to Southeast Alaska.

Objective: Maintain a Forest-wide system of old-growth forest habitat (includes reserves, non-development land use designations, and beach, estuary and riparian corridors) to sustain old-growth-associated species and resources. Ensure that the reserve system meets the minimum size, spacing, and composition criteria described in Appendix K of the Forest Plan. Provide sufficient habitat to preclude the need for listing species under the Endangered Species Act due to habitat conditions on National Forest lands.

Background: Two coarse-filter approaches are used here to monitor Forest biodiversity. The first focuses on the spatial distribution and composition of old-growth reserves and the cumulative harvest of old-growth timber by Biogeographical Province. It is assumed that the GIS database will be measured using a current layer. The second examines emerging information concerning sensitive species conservation on the Forest.

Biodiversity Question 1: Are contiguous blocks of old-growth habitat being maintained in a Forest-wide system of old-growth reserves to support viable and well-distributed populations of old-growth-associated species and subspecies?

The effects of management activities on the Tongass old-growth conservation strategy were determined by reviewing project-level environmental documents and Forest Plan amendments for their effects on the spatial distribution, size, and composition of old-growth habitat reserves. This is consistent with the Biodiversity Evaluation Criteria and Sampling Methods listed in the Forest Plan.

Iverson (1997) provides a detailed evaluation of the old-growth habitat reserve (OGR) system that serves as a benchmark to the conditions of the old-growth habitat reserves system at the time the TLMP Revision ROD was signed. This analysis and other analyses (e.g., panel assessments) associated with the TLMP Revision (1997) concluded this strategy was largely sufficient. At this time we have no information indicating these OGR system analyses need to be updated other than to report changes in OGR boundaries. These changes are reported here.

Monitoring Results

Since the signing of the TLMP Revision RODs in 1997 and 1999, fourteen environmental documents have changed the size or composition of old-growth reserves. These changes are summarized in Table 2.1. None of the changes significantly changed the spacing of the reserves. Two of five environmental documents that had RODs signed during FY 2000 (Indian River Timber Sale(s) and Skipping Cow Timber Sale) did not amend OGR boundaries and are not included in Table 2.1.

Since the signing of the 1997 ROD, lands within the old-growth habitat LUD have increased by 12,441 acres and now contain 4,944 more acres of productive old growth. Old-growth habitat reserves modified during FY 1998, FY 1999, and FY 2000 exceed productive old-growth requirements (Appendix K, TLMP 1997) by 8,346 acres (49 percent).

These changes have reduced the timber base available for timber harvest by 2,452 acres.

Evaluation of Results

Over the past three fiscal years, project level decisions have generally increased the size and improved composition of old-growth reserves.

Recommendations

1) Continue to review and modify OGRs during project-level planning.
2) Improve NEPA documents and GIS procedures to make it easier to track changes in OGRs.
    a) Maintain LUD coverage for each fiscal year.
    b) Code OGR by size (large, medium, small).
    c) Include the size and composition of the OGRs before and after the changes in the NEPA documents.
3) Continue to consider and review comments in Iverson (1997) for improving the size, spacing, and composition of old-growth reserves during project planning.

Table 2.1 Summary of Acreage Changes in the Old-growth LUDs Documented in Project-level NEPA RODs During Fiscal Year 2000 [3].

Project FY ROD Signed	VCU	5/97 OGR Acres *(POG)*	Guideline OGR Acres *(POG)*[1]	Modified OGR Acres *(POG)*	Net Change OGR Acres *(POG)*	Net Change Suitable Acres [4]	Comments
Canal Hoya 1998	5200	2,090 *(1,630)*	2,901 *(1,450)*	9,210 *(2,740)*	7,120 *(1,110)*	-151	1) Expanded to meet size requirement
Chasina 1998	6800	1,525 *(537)* [2]	637 *(318)*	2,202 *(842)*	667 *(305)*	-78	1) Too small due to private lands. 2) Expanded to meet size requirement
Control Lake 1998	5972 5971	5,073 *(2,418)* [2]	3,404 *(1,702)*	4,596 *(2,359)* [2]	-477 *(-59)*	+304	1) Remove 2nd growth 2) Improve connectivity 3) Includes small part of 5980
Crystal Creek (Delta Creek) 1998	487	2,800 *(1,680)*	3,195 *(1,598)*	4,100 *(2,340)*	1,330 *(660)*	+6	1) Include goat range 2) Maintain corridor along Paterson R. 3) Reduce 2nd growth
Crystal Creek (Brown Cove) 1998	489	4,650 *(2,550)*	6,444 *(3,222)*	4,840 *(2,640)*	190 *(90)*	-372	1) Add goat range 2) Improve connectivity 3) Brown Cove in same VCU
Crystal Creek (Pt Agassiz) 1998	489	2,350 *(1,260)*	Part of Brown Cove	2,270 *(1,400)*	-80 *(140)*	-306	1) Reduce beach and riparian buffers 2) Add high volume stands
Todhal Back1998	443	1,557 *(687)*	2,106 *(1,598)*	2,159 *(1,090)*	602 *(403)*	-361	1) Meet POG requirements
Niblack EA 1998	6830	583 *(344)*	1,414 *(707)*	1,499 *(828)*	916 *(484)*	+252	1) Meet POG requirements
Nemo Loop Thoms Lake 1998	479	12,203 *(7,157)*	10,000 *(5,000)*	12,430 *(7,917)*	227 *(760)*	-755	1) Fixed mapping error to allow road corridor 2) Improve connectivity
Sea Level 1999	756	1,160 *(800)*	1,308 *(654)*	1,395 *(716)*	235 *(-84)*	-315	1) Meet size requirement 2) Improve connectivity
Kuakan Timber Sale 2000	525	1,141 *(931)*	1,526 *(763)*	1,564 *(999)*	+423 *(+68)*	-126	1) Meet size requirement 2) Improve location
Doughnut Timber Sale 2000	476 477	2,001 *(1,560)*	3,090 *(1,540)*	3,090 *(1,620)*	+1,089 *(+60)*	+14	1) Meet size requirement
Luck Lake 2000	581 582 583	5,984 *(2,884)*	5,874 *(3,015)*	6,156 *(3,841)*	+172 *(+957)*	-537	1) Meet size requirement 2) Improve location
Salty Timber Sale 2000	747	2,576 *(1,821)*	2,580 *(1,290)*	2,603 *(1,871)*	+27 *(+50)*	-27	1) Meet size requirement 2) Improve connectivity
Total	**N/A**	**43,117 *(24,438)***	**41,899 *(21,567)***	**55,511 *(29,332)***	**12,414 *(4,894)***	**-2,425**	

1) Required acreage (Appendix K, TLMP 1997).
2) Numbers not found in environmental document. It was determined by subsequent GIS analysis for this report.
3) All numbers are in acres; POG = volume strata H, M, L; OGR = Old-growth reserve.
4) Suitable acres are those that are suitable for timber harvest.

Biodiversity Question 2: Are the effects on biodiversity consistent with those estimated in the Forest Plan?

Monitoring Results

Biodiversity analyses conducted for the Forest Plan assume that the amount of timber harvest is an index of potential effects on biodiversity. For this report, we assume that this approach is appropriate, and track timber harvest units for FY 1998 through FY 2000. These harvest units were placed into GIS and summarized by province and volume strata. During FY 1998, 1999 and 2000, 3416, 3586, and 5402 acres of productive old growth (POG) were treated by some type of timber harvest method (clearcut, clearcut with reserves, or partial cutting), respectively. Of these acres, 7291 acres were in the "high" volume stratum. These data are summarized by ecological province in Table 2.2.

The Forest Plan allowed for an ASQ harvest of 267 MMBF in 1998, and 187 MMBF in the revised Record of Decision (April 1999). ASQs of 267 and 187 MMBF equate to an average annual harvest of 8,529 and 6,520 acres of POG, respectively, for the first decade of the plan.

Biodiversity analyses within the Forest Plan assume the maximum level of harvest. About two thirds (averaging 4,150 acres a year) of the allowed harvest has occurred during the first three years of plan implementation. Therefore, the magnitude of timber harvest and the potential impacts on biodiversity have been less than those forecast in the Forest Plan. It is too early in the implementation of the Forest Plan to conclude whether this trend will continue throughout the decade.

Evaluation of Results

1) Continue to monitor timber harvest levels as an index for the effects of management on biodiversity.
2) Since volume strata give an incomplete and sometimes misleading picture of forest structure and age, continue to support efforts to construct better existing vegetation maps for the Tongass NF.
3) Continue to develop GIS to track type of harvest method so partial cuts can be reported separately from clearcut.

Table 2.2 Acres of Timber Harvest During FY 1998, 1999 and 2000 by Province and Percentage of Total POG and High Volume POG Harvested

	Province	Acres Harvested During FY 1998/1999/ 2000	1997 Total POG Acres	% POG Harvested in FY 1998/1999/ 2000	High Stratum POG Acres	% High Stratum POG Harvested in FY 98-00
1	Yakutat Forelands	0/0/0	47,720	0	27,881	0
2	Yakutat Uplands	0/0/0	24,136	0	11,448	0
3	East Chicagof Is.	20/23/0	409,659	0.01	155,323	0
4	West Chicagof Is.	0/0/0	72,274	0	18,984	0
5	East Baranof Is.	312/133/0	97,888	0.45	31,768	0.94
6	West Baranof Is.	0/0/0	218,763	0	56,691	0
7	Admiralty Is.	0/0/0	591,407	0	337,194	0
8	Lynn Canal	0/0/0	155,577	0	62,363	0
9	North Coast Range	0/0/0	324,305	0	131,789	0
10	Kupreanof/ Mitkof Is.	513/490/560	318,928	0.49	104,893	0.83
11	Kuiu Is.	0/431/756	302,451	0.39	173,022	0.55
12	Central Coast Range	0/0/0	245,065	0	105,020	0
13	Etolin Is.	0/120/404	229,765	0.23	82,216	0.37
14	North Central POW	1903/1188/2565	531,261	1.06	220,131	1.33
15	Revilla Is./Cleveland	668/1152/916	520,989	0.53	254,814	0.66
16	South Outer Islands	0/48/201	115,487	0.22	50,784	0.44
17	Dall Is. and Vicinity	0/0/0	68,326	0	33,925	0
18	South POW	0/0/0	161,981	0	74,361	0
19	North Misty Fiords	0/0/0	198,824	0	77,162	0
20	South Misty Fiords	0/0/0	312,945	0	111,452	0
21	Ice Fields	0/0/0	115,821	0	37,798	0
	Total	**3416/3585/5402**	**5,063,572**	**0.24**	**2,159,091**	**0.34**

Biodiversity Question 3: Are management practices consistent with current knowledge regarding sensitive species conservation?

In reference to the Forest Plan's monitoring plan, "sensitive species" are defined as federally (FWS and NMFS) listed threatened or endangered species, USDA Forest Service Alaska Region sensitive species, and State (ADF&G) species of concern. It is not Forest Service policy to conduct Biological Evaluations (BE's) on State species of concern, except for those State species which are federally listed by the U.S. Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service (NMFS) as threatened, endangered, or proposed (T&E), or by the Regional Forester as sensitive.

Monitoring Results

The sampling methods are separated into four parts.

I. "Annually review [USFS] files and recent information regarding sensitive species taxa on the Tongass National Forest" (Forest Plan page 6-5).

Twenty Forest Service biologists, botanists and ecologists reviewed the Forest and Regional Office files and noted consistency with the standards and guidelines and land use designations (LUD's) of the 1999 Tongass Forest Plan. Some recent scientific publications are contrary to aspects of the Forest Plan, but the same types of information and concepts were considered during analyses for the Forest Plan, which was based on the dominant scientific literature (e.g., debate over the design of partial timber harvests with respect to appropriate stand structure for marten and goshawks). During FY 2000, the August 1998 Tongass Plan Implementation Team (TPIT) Appendix A protocols for inventory and survey were in effect. These protocols provided for the survey of any T&E or sensitive species to gather information for project-level Biological Evaluations (BE's) or Biological Assessments (BA's). Occasionally the idea has been discussed that the Regional Forester's sensitive species list should perhaps be reduced, given the amount of land protected in the Forest Plan 1999 Record of Decision (ROD), as well as its management standards and guidelines.

II. "Consult with other agencies regarding [management practices for] these species and whether additional species should be considered for addition to the Region 10 sensitive species list" (Forest Plan page 6-5). Summarize the "results of any consultations with ADF&G and U.S. FWS under the MOU with those agencies" (Forest Plan page 6-5).

Twenty Forest Service biologists, botanists and ecologists found no letters from any other agency (NMFS, FWS, ADF&G or the Alaska Natural Heritage Program) with pertinent comments regarding sensitive species during FY 2000 in the Forest or Regional files. On October 26, 2000, the Forest sent a letter to the pertinent agencies (NMFS, FWS, ADF&G, and the Alaska Natural Heritage Program) for any letters or memorandums that Forest Service personnel might have missed. A request was also made for any comments that the other agencies might have with respect to the sensitive species list and appropriate management practices. The only substantive response was from the NMFS, which pointed out that several anadromous fish species that breed in the Pacific Northwest have been added to the threatened or endangered species lists, and that these fish may swim past the Tongass National Forest. In a letter dated October 27, 2000 regarding the Emerald Bay Timber Sale, the NMFS required measures for the protection of humpback whales and Steller sea lions. The NMFS measures are consistent with Tongass Forest Plan standards and guidelines, but in the past the Forest Service has maintained it did not have the authority to implement the marine mammal standards and guidelines beyond Tongass National Forest lands for non-Forest Service personnel. The Forest Service received no other comment from another agency.

III. "Evaluate data collected in studies to determine the need for changes in the standards and guidelines of the Tongass Land Management Plan" (Forest Plan page 6-5).

Schumacher (1999. A multi-scale analysis of habitat selection at dens and resting sites of American martens in southeast Alaska. M.S. Thesis, Univ. of Wyoming, Laramie, WY) recommended that the partial harvest standards and guidelines for marten (Forest Plan page 4-119) be implemented with larger trees and logs than in the Forest Plan, and that the trees left in a harvest unit should be clumped in patches over 30 meters in diameter rather than evenly distributed as required by the Forest Plan.

Although the marten is not a sensitive species, any such change would affect the habitat of sensitive species. In the1998 Status Review for the goshawk in the western United States outside of Alaska, the USFWS found that evenly distributed partial harvesting within units in rainforest could adversely affect goshawk hunting; according to the USFWS, this practice would encourage the development of dense shrubs and dense understory trees, which could impair the ability of goshawks to capture prey. If the Forest Plan's standards and guidelines for partial harvesting are reconsidered, any analysis should consider that the existing standards and guidelines calling for somewhat even distribution of the leave trees may well be the best system for the majority of forest species as well as the long-term ecological function of the stand many decades into the future.

IV. "Summarize results of Biological Evaluations [BE's] and associated effectiveness monitoring conducted at the project level" (Forest Plan page 6-5).

No project-level effectiveness monitoring was performed during FY 2000. Broad-scale monitoring continued for the Queen Charlotte goshawk, the Fish Creek chum salmon, and the trumpeter swan. Those monitoring activities showed no result different from those described in the 1997 FEIS and appendices, which supported the Forest Plan.

BE's/BA's on Listed T&E Species

The Tongass BE's and Biological Assessments (BA's) during FY 2000 for listed threatened and endangered (T&E) species consistently found either "no effect" or "not likely to adversely affect": 28 findings on the humpback whale, 29 on the Steller sea lion, four on the Snake River chinook salmon (including both the spring/summer and fall runs), and four BA's on the Snake River sockeye salmon.

Several additional runs of listed fish, named by the NMFS as requiring assessment (NMFS letter dated October 26, 2000 on the Emerald Bay Timber Sale) after the end of FY 2000, were not addressed in BE's/BA's during FY 2000 on the Tongass National Forest: the Upper Columbia River spring chinook salmon, the Upper Columbia River steelhead, the Puget Sound chinook salmon, the Lower Columbia River chinook salmon, the Upper Willamette River chinook salmon, the Snake River Basin steelhead, the Lower Columbia River steelhead, the Upper Willamette River steelhead, the Middle Columbia River steelhead, and the Lake Ozette sockeye salmon. To our knowledge, these fish runs had not been identified as needing assessment for Tongass National Forest activities prior to the end of FY 2000 (September 30, 2000). With the Tongass National Forest now participating in subsistence management decisions for fisheries, and given the additional fish runs named by the NMFS for assessment, the number of BE's/BA's on listed T&E fish runs should increase during FY 2001.

Sensitive Animal BE's

The BE's for 31 projects during FY 2000, for USDA Forest Service Regional Forester sensitive animal species, usually found either "no effect" or "not likely to adversely affect." However, one of the two BE's for island run and Wheeler Creek king salmon came to the determination of "may affect individuals but not likely to adversely affect the population." This same determination was made in 4 of the 31 BE's for the Queen Charlotte Goshawk. The only BE with a generalized "may affect" outcome was one of the 29 BE's on the Peal's Peregrine Falcon, the BE for the Cape Trail Lighthouse.

Sensitive Plant BE's

The Alaska Regional Forester has designated as sensitive 15 plant species that could occur on the Tongass National Forest. Not all 15 species were considered for every one of the 30 projects, because the species do not occur everywhere. The 30 project analyses also considered other species, but this section only considers the 15 sensitive plants of the Tongass National Forest: Eschscholtz's little nightmare (*Aphragmus eschscholtzianus*), Norberg arnica (*Arnica lessingii* ssp. *norbergii*), Goose-grass sedge (*Carex lenticularis* var. *dolia*), Edible thistle (*Cirsium edule*), Pretty shooting star (*Dodecatheon pulchellum* ssp. *alaskanum*), Davy mannagrass (*Glyceria leptostachya*), Wright filmy fern (*Hymenophyllum wrightii*), Truncate quillwort (*Isoetes truncata*), Calder lovage (*Ligusticum calderi*), Bog orchid (*Platanthera gracilis*), Loose-flowered bluegrass (*Poa laxiflora*), Kamchatka alkali grass

(*Puccinellia kamtschatica*), Unalaska mist-maid (*Romanzoffia unalaschcensis*), Queen Charlotte butterweed (*Senecio moresbiensis*), and Circumpolar starwort (*Stellaria ruscifolia* ssp. *aleutica*).

In 98 percent of the 374 cases (one sensitive plant X one project), the determination was “no effect” (24.3 percent of the cases), “not likely to adversely affect” (35.5 percent), or “may affect individuals but not likely to affect the population” (38.2 percent). In the remaining 2.0 percent of the cases, the botanist or ecologist did not make any determination.

Evaluation of Monitoring Results

No formal evidence was found within FY 2000 written analyses or correspondence indicating that the Regional Forester’s sensitive species list is in need of revision at this time. However, given the extensive amount of land protected since the sensitive species list was last revised, the Regional Forester’s sensitive species list should be reconsidered. The Tongass Forest Plan standards and guidelines for sensitive species generally appear adequate. However, a mechanism needs to be found to apply the marine mammal disturbance standards and guidelines to non-Forest Service personnel and vehicles when they are associated with USDA Forest Service projects (or permitted activities) but are not under the direct supervision of Forest Service personnel (e.g., log rafts under tow). The design of the partial harvest standards and guidelines for goshawks and marten should perhaps be reconsidered; however, any analysis should fully consider that the existing standards and guidelines, which call for a fairly even distribution of the leave trees, might be the best system for the majority of rainforest forest biota as well as best for the long-term ecological function of the stand many decades into the future.

For BE’s and BA’s, Tongass biologists need to consider the most recent list of T&E species as provided by the NMFS and the USFWS. Proposed actions that require more than 90 days in processing and approval require that the NMFS and FWS be contacted to obtain an updated list. Tongass biologists and botanists need to assure that the wording of each BE/BA determination is consistent with Forest Service manual direction. Also, Tongass biologists and botanists need to carefully describe the logic for their conclusions in their BE’s and BA’s. BE/BA determinations need to be based on the type and magnitude of the project proposed, on site-specific species surveys or local information such as existing databases, on scientific literature, and/or on previous analyses. Given such information, logical deductions may then be made in such a manner that other biologists or botanists would likely arrive at the same conclusion.

Biodiversity Question 4: Are destructive insect and disease organisms increasing to potentially damaging levels following management activities?

Goal: Part 219 of the National Forest System Land and Resource Management Planning regulations (36 CFR section 219.12) requires the monitoring of forest health and determining if destructive insect and disease organisms have increased following vegetation management. Areas are identified where destructive insect and disease organisms have increased, and management practices are modified if these increase to damaging levels. Monitor forest health and determine if destructive insects and diseases increase following vegetation management as required by the above referenced regulations.

Objective: Identify areas where destructive insect and disease organisms increase following management. Evaluate the results and modify vegetation management practices should insects and disease increase to damaging levels.

Background: A key premise of ecosystem management is that native species have adapted to, and in part, evolved with natural disturbance events. Along with wind, avalanche, and other disturbance agents, insects and diseases are important factors in the Tongass National Forest. Most occurrences of insects and disease are natural and considered a part of, and contributing factor to, ecosystem diversity. Endemic levels of insect and disease activity are usually allowed to run their course. Heart rot decays are a key agent causing small-scale disturbance in the Forest, which results in bole breakage in older trees. Average defect in late seral stands is approximately 1/3 of gross volume. The incidence of decay is significantly related to tree age. Hemlock and spruce less than about 100 years of age are generally sound. Older hemlock deteriorates at a faster rate than Sitka spruce. Based on research by James Kimmey, for trees in age class 151 to 200, defect in Sitka spruce was 5 percent, while in hemlock it was 16 percent (Farr, 1976). At 300 to 400 years of age, spruce is relatively rot free, whereas decay in hemlock averages 30 to 40 percent on a board-foot basis (Farr, 1976). Research by Kimmey (1956) also indicates that volume losses are small in young trees.

As for forest insects, trends in population are generally linked to weather conditions as opposed to forest management practices. For example, the Spruce needle aphid occurred on 44,400 acres in Southeast Alaska from the southern end of Prince of Wales Island to Cape Fairweather in 1998 and 29,500 acres in 2000. The winters of 1998 and 2000 were generally mild for Southeast Alaska. In contrast, the winters of 1996 and 1997 were colder. Subsequent outbreaks of Spruce needle aphid were less severe for those years, with 600 and 440 acres of land affected, respectively. Areas affected by the outbreak were late-seral spruce-hemlock forest and not managed young-growth. Other defoliating insects, hemlock sawfly and black-headed budworm, have caused growth loss, topkill, and some mortality in late-seral forests. Outbreaks can affect western hemlock and to a lesser extent Sitka spruce throughout the Tongass, as did the outbreak in the early 1950's, which resulted in topkill and mortality on only a fraction of the acres affected. In 2000 only 5,200 acres of hemlock sawfly defoliation were recorded. Spruce beetle has been a rather minor problem on the Tongass compared to other lands in Alaska but outbreaks such as the one brought on by the extensive windthrow that occurred in the winter of 1990-1991 resulted in the buildup of a population of beetles that killed many acres of high value Sitka spruce throughout Southeast Alaska. These spruce beetle outbreaks are short in duration. The annual pest survey will help to identify where mortality has most recently occurred so that trees can be harvested before they decay. Only 109 acres were mapped on the Tongass National Forest in 2000.

Monitoring Question: Are destructive insect and disease organisms increasing to potentially damaging levels following management activities?

Annual aerial detection surveys are flown over Southeast Alaska by the State and Private Forestry branch of the Forest Service, Forest Health Group. The location of insect and desease activity is mapped and entered in a geographic information system (GIS) database. In addition to the aerial survey work, on-the-ground site visits are also conducted. In general, current management reduces the incidence and severity of insect and disease occurrence by removing infected trees through timber harvest. Even-aged vegetation management (clearcutting, seed tree or shelterwood regeneration methods) removes defective trees with fungal infections or those with mistletoe. The Tongass National Forest Land and Resource Management Plan estimated that approximately 80 percent of future harvests will use the even-aged

system. Past management has been above this level. The young growth that results after an even-aged harvest is vigorous and usually decay-free.

Currently the Forest Service is exploring alternatives to clearcutting where portions of the stand, either as single trees or groups of trees, are left as legacy (residual) trees. Questions have been raised as to whether increased blowdown and increased insect and disease damage will occur due to bole wounding of residual trees and/or retention of mistletoe and other infestations within the stand. These questions will be studied in a series of three research installations across the Tongass National Forest. Results of these studies will not be available for three to five years.

Monitoring Results

The most important diseases and natural declines on the Tongass National Forest in 2000 were wood decay of live trees, hemlock dwarf mistletoe, and yellow-cedar decline. Heart and butt rot fungi cause substantial decay in late seral spruce-hemlock forests. No serious insect or disease organisms in young-growth stands were detected through monitoring efforts.

Evaluation of Results

The monitoring work conducted annually by the State and Private Forestry branch of the Forest Service, Forest Health Group and the Forest Silvicultural staff is adequate.

Fish Habitat

Goal: Maintain or restore the natural range and frequency of aquatic habitat conditions on the Tongass National Forest to maintain the abundance and diversity of resident and anadromous fish.

Objective: Determine if our best management practices (BMPs) and Forest Plan standards and guidelines have been implemented and if they are effective in protecting fish habitat and fish populations. Monitor key stream channel characteristics and representative fish populations to determine if trends attributable to forest management are evident.

Background: Fish and aquatic resources on the Tongass National Forest provide major subsistence, commercial, and sport fisheries. Abundant rainfall and watersheds with high stream densities provide a high number and diversity of freshwater fish habitats. The Tongass National Forest provides spawning and rearing habitats for the majority of fish produced in Southeast Alaska. Maintenance of this habitat and high water quality is of concern to the public, State and Federal natural resource agencies, and Native organizations.

In FY 2000, major emphasis was placed on monitoring resident fish populations, fish passage conditions at road culverts, BMP implementation, and stream habitats. Work continued to develop a synthesized approach for all aspects of fish habitat monitoring. A technical team of Forest Service specialists and an advisory team of employees from the cooperating agencies continued to meet, and a plan for synthesizing the aquatic monitoring was developed.

Fish Habitat Question 1: Are population trends for Management Indicator Species (MIS) and their relationship to habitat changes consistent with expectations?

A full monitoring program for trends in the populations of resident cutthroat trout and Dolly Varden char and their habitat was initiated following successful completion of pilot monitoring in 1999. The full program focused on locating additional streams meeting the specific criteria identified in the monitoring protocol, and making population estimates and completing Tier 3 habitat surveys in as many streams as possible.

The protocol incorporates a design that requires monitoring streams before and after timber harvest. Some streams were sampled for the second year in this long-term program while others were sampled for the first time.

Progress was made in developing monitoring protocols for coho and pink salmon. These species were also identified as MIS in the Forest Plan. The Forestry Sciences Laboratory, working with the Alaska Department of Fish and Game, has prepared a proposal to develop a protocol that will include annual monitoring of the number of coho smolts migrating from one or two medium-sized watersheds. Additionally, juvenile coho populations and habitat will be monitored in tributary streams subject to variable logging strategies.

For pink salmon, we decided to review the last 30 years of spawning escapement data that have been collected in over 700 watersheds and timber harvest history for the same watersheds. If trends are detectable in the existing data, we plan future monitoring to see if trends in pink salmon are also evident with logging conducted under the current standards and guidelines. It is assumed that older logging was less fish friendly than logging planned under the current standards and guidelines. If trends between logging and pink salmon escapement are not evident in the older data, we probably will not spend the resources to monitor for potential effects of future logging.

Kuiu Island has been selected as a pilot for review of the existing pink salmon escapement and logging history data. Eighty-one streams have been identified for Kuiu that have long-term escapement records, and a strategy has been developed to quantify the logging history for each watershed. We are currently attempting to link the watersheds with escapement data to Forest Service GIS data to analyze past timber harvest impacts on escapement.

Monitoring Results for Resident Cutthroat and Dolly Varden

At the end of the 2000 field season, 19 streams across the Tongass National Forest were identified and field-verified that meet the selection criteria specified in the monitoring protocol (Table 2.3).

The selection criteria include:

- Streams with resident cutthroat and/or Dolly Varden;
- reaches upstream from migration barriers to prevent interaction with anadromous fish;
- FP3, MM1 channel types;
- no previous logging, but with planned future logging; and
- not connected to lakes.

Additionally, three streams have been identified above barriers with resident fish, but with no planned future logging. These streams will serve as controls. One of the control streams is an FP4 and another an MC1 channel type. These channel types are similar to those requested in the protocol and will be retained, at least until the number of identified control streams increases. Two of the three control streams were deliberately chosen, but the third, Gypsy Cr 2, was originally selected as a treatment stream. The selected alternative in the Madden Timber Sale FEIS did not include harvest or road construction upstream from the Gypsy Cr 2 site, so this treatment stream has been converted to a control.

Table 2.3 — Summary of Stream Reaches for Resident Fish Monitoring in 2000

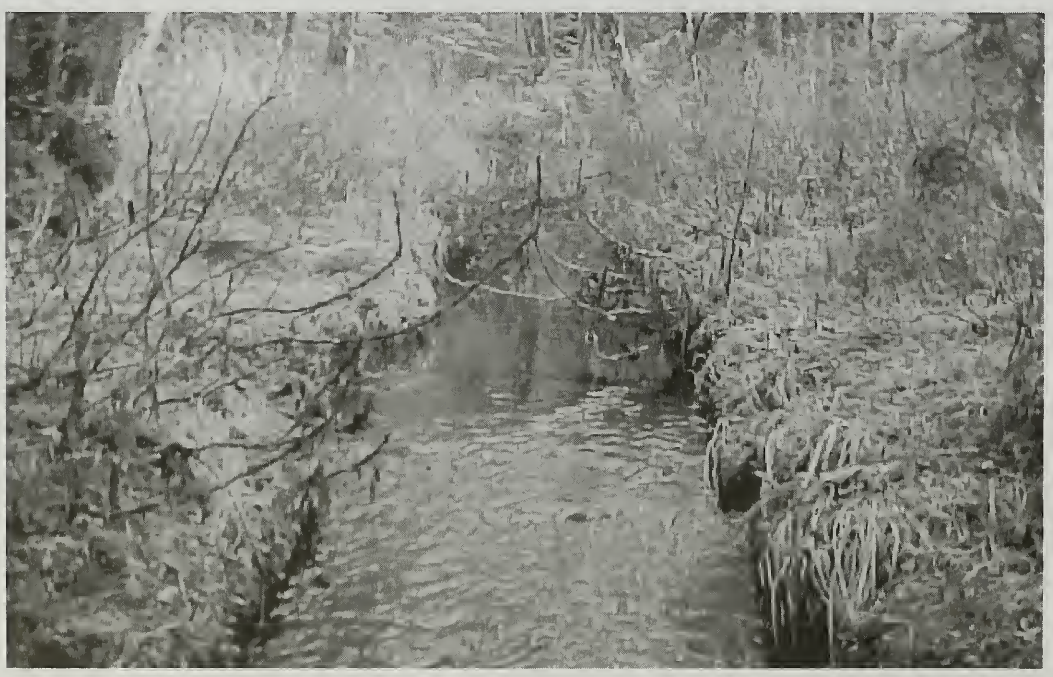
Ranger District	Stream Name	Year of Timber Harvest	Field Verified	Channel Type	Fish Species	Population Estimate	Habitat Survey
Craig	Drinking Water Cr	2001	Yes	MM1	Cut, DV	Yes	Yes
	N Perkins Cr	2004	Yes	MM1	Cut, DV	Yes	No
	Keg Cr	Control	Yes	FP4	DV	Yes	Yes
Thorne Bay	No streams identified						
Ket-Misty	Montana Cr	2001	Yes	MM1	Cut	Yes	Yes
	Packer Cr	2001	Yes	MM1	Cut, DV	Yes	Yes
	Gun Sight Cr	2001	Yes	MM1	DV	Yes	Yes
	Salty Cr	2002	Yes	MM1	Cut	Yes	Yes
	Emerald Cr	2003	Yes	MM1	Cut	No	No
Wrangell	Gypsy Cr 1	2002	Yes	MM1	Cut	Yes	No
	Gypsy Cr 2	Control	Yes	MC1	Cut	Yes	No
	West Fork Hoya Cr	2001	Yes	FP3	DV	Yes	No
	Vial Cr	2001	Yes	MM1	DV	Yes	No
	Jenkins Cr	2002	Yes	MM1	Cut	No	No
Petersburg	N Arm Farragut Cr	2002	Yes	FP3	Cut, DV	Yes	No
	Upper Tunehean Cr	2001	Yes	MM1	Cut, DV	Yes	No
	Lower Zim Cr	2002	Yes	FP3	Cut, DV	Yes	No
	Upper Zim Cr	2002	Yes	MM1	Cut, DV	Yes	No
	Upper Ohmer	Control	Yes	MM1	DV	No	No
Juneau	Head of Dry Bay Cr 1	2003	Yes	MM1	DV	No	No
	Head of Dry Bay Cr 2	2003	Yes	FP3	DV	No	No
Hoonah	S Fork Freshwater Cr	2003	Yes	MM1	Cut, DV	No	No
Sitka	Corner Bay Tributary	2007	Yes	FP3	Cut	No	No
Yakutat	No streams identified						

During the last two years, population estimates for resident cutthroat and Dolly Varden have been completed in 14 treatment streams; for six of those streams we now have two years of population data (Table 2.4). Population estimates have been completed in two control streams, and we have two years of data for one of those. Of the 16 streams sampled for fish populations, eight have cutthroat and Dolly Varden, four only cutthroat, and four only Dolly Varden.

The estimated number of cutthroat and Dolly Varden varied widely among the sampled streams (Table 2.4). We anticipated finding more fish in FP channels compared to the slightly steeper MM channels. While it is generally true that FP channels have high numbers of fish, in this case the two streams with the most fish were MM channels. The highest number was for the pure Dolly Varden population in Gun Sight Creek, with an estimate of 212 in 2000; the second highest was the combined number of cutthroat and Dolly Varden of 198 in Upper Tunehean Creek.

Table 2.4 Fish Population Estimates for 1999 and 2000

Ranger District	Stream Name	Year of Timber Harvest	Fish Species	1999 Population Estimate	2000 Population Estimate
Craig	Drinking Water Cr	2001	Cut	3	12
	Drinking Water Cr	2001	DV	19	14
	N Perkins Cr	2004	Cut	18	17
	N Perkins Cr	2004	DV	11	20
	Keg Cr	Control	DV		99
Ket-Misty	Montana Cr	2001	Cut	31	39
	Packer Cr	2001	Cut		59
	Packer Cr	2001	DV		44
	Gunsight Cr	2001	DV		212
	Salty Cr	2002	Cut		50
Wrangell	Gypsy Cr 1	2002	Cut	33	32
	Gypsy Cr 2	Control	Cut	33	61
	West Fork Hoya Cr	2001	DV		169
	Vial Cr	2001	DV		142
Petersburg	N Arm Farragut Cr	2002	Cut	91	133
	N Arm Farragut Cr		DV	19	50
	Upper Tunehean Cr	2001	Cut	97	119
	Upper Tunehean Cr		DV	54	79
	Lower Zim Cr	2002	Cut		74
	Lower Zim Cr		DV		No estimate
	Upper Zim Cr	2002	Cut		107
	Upper Zim Cr		DV		56
Hoonah	S Fork Freshwater Cr	2003	Cut	No estimate	
	S Fork Freshwater Cr		DV	19	



The amount of habitat important to fish in the monitoring streams is shown in Table 2.5. Complete data on reach lengths, total surface area, additional descriptions of the large woody debris, the pools, and substrate are available upon request. Comparison of data between streams is not as important as the eventual comparison of the habitat before and after timber harvest.

Table 2.5. Stream Habitat Survey Results for 1999 and 2000

Ranger District	Stream Name	Year of Survey	Total Pieces LWD	Total Pool Area (M2)	Average Residual Pool Depth (M)	Length Undercut Banks (M)	Substrate (D50) (MM)
Craig	Drinking Water Cr	1999	38	113.3	0.31	124	68
	Drinking Water Cr	2000	41	162	0.31	99	70
	N Perkins Cr	1999	33	96.8	0.29	87	20
	Keg Cr	2000	44	207.7	0.62	39	48
Ket-Misty	Montana Cr	1999	22	154.7	0.31	19	42
	Montana Cr	2000	32	160.6	0.31	0	39
	Packer Cr	2000	37	184.6	0.34	11	55
	Gun Sight Cr	2000	99	295.5	0.61	33	31
	Salty Cr	2000	20	59.7	0.30	11	45
Wrangell	Gypsy Cr 1	1999	83	455.1	0.60	47	102
	Gypsy Cr 2	1999	22	135.1	0.30	8	73
Petersburg	N Arm Farragut Cr	1999	62	460.6	0.49	20	30
Hoonah	S Fork Freshwater Cr	1999	41		0.30		30

Evaluation of Results

Year 2000 was the first year for a full resident fish MIS monitoring program. A pilot run in 1999 was successful and the Interagency Monitoring and Evaluation Group (IMEG) decided to move to full implementation of the protocol. A major goal for the year was to increase the number of monitoring streams and to broaden the distribution of the streams to include more of the districts with a timber harvest program. This goal was achieved.

A power analysis was completed that suggested 16 treatment streams would be necessary in our pared-t test experimental design. This will provide an 80 percent chance of detecting a decline in fish populations if the decline is greater than 0.80 of the standard deviation of the samples. Existing long-term data sets for resident cutthroat in Oregon and for Dolly Varden in Southeast Alaska indicate we will be able to detect a decline of approximately 20 percent of the pre-logging mean annual population.

Even though the power analysis indicated 16 streams would be sufficient for the minimum monitoring program and we now have 19 field verified treatment streams, we plan to continue identifying and adding treatment streams for a more robust program. Doing so, more importantly, will account for anticipated fall-down in the planned timber harvest that will likely reduce our sample of treatment stream.

Control streams were added to the design this year following a recommendation from the IMEG. Control streams are not required for the pared-t test, but will help to explain changes in the fish populations that might not be related to timber harvest. We plan to focus our resources on adding more treatment streams, but will also include controls where possible.

District and SO employees completed the population estimates. A crew of two or three persons made the estimates for each stream in a single day. Two experienced teams have been identified to complete all the habitat surveys, in order to increase consistency. Habitat surveys are considered to more likely have subjective data errors than population estimates. Completing the habitat surveys has been less successful than completing the population estimates. This probably occurred since the population work is spread among many district biologists, and the habitat work was concentrated on fewer individuals with existing workloads. We hope to hire a person to focus on habitat surveys for next year.

The removal method population estimates were not possible in two instances, as the final catch increased substantially from the first or second catches. We believe this is a random error caused by the low

number of fish of that species in those streams. Generally, the 95 percent confidence intervals around the estimated number of fish are narrow and we are satisified with the results of the population sampling.

No trend analysis of the data is appropriate at this time. Potential trends in fish populations and habitat features due to forest management will only be possible following collection of several years of pre-harvest and post-harvest data. Several streams may be harvested as soon as 2001 and most are scheduled for harvest within the next three years. The protocol recommends allowing two years following timber harvest before beginning to sample the fish populations to allow for potential response from logging. As planned, the first post-harvest sampling will occur in 2004.

Fish Habitat Question 2: Are Fish Riparian standards and guidelines being implemented?

Best management practices (BMPs) described in the Soil and Water Conservation Handbook (Forest Service Handbook 2509.22, October 1996) define practices that provide protection for soil and water resources. The Fish Riparian standards and guidelines define site-specific measures to protect the resources. These standards and guidelines were monitored following a methodology described in the Tongass Monitoring Strategy. The strategy was developed to provide direction for Tongass Land Management Plan implementation monitoring.

Please refer to the 2000 BMP Implementation Monitoring Report in the Appendix for details on how the monitoring was conducted. A summary of the findings for the fish and riparian resources relative to disturbance is given below.

The BMP implementation monitoring included two distinct efforts: (1) 100 percent monitoring of the units closed out and roads complete, and (2) Interdisciplinary Team (IDT) monitoring. The 100 percent monitoring was primarily conducted by Forest Service sale administrators and engineering representatives, with assistance from resource specialists in a few circumstances. A team of Forest Service employees and other Federal and State agency representatives conducted the IDT monitoring. Included were sale administrators, engineers, foresters, planners, and resource specialists from soils, water and fisheries. The IDT monitoring was conducted on a stratified random sample of more than 10 percent of units and roads monitored during the 100 percent monitoring effort.

Monitoring Results

A total of 210 units and 71 road sites (on 35 different roads) were monitored this year through the 100 percent implementation monitoring process. A subset of the total BMP implementation monitoring pool consisting of 35 units and 32 road sites (on 13 different roads) was monitored during the 10 percent IDT monitoring process. Details of this effort are included in Soil and Water Question 3.

BMPs Applicable to Fish and Riparian Management

- BMP 12.6 Riparian Area Designation and Protection
- BMP 12.6a Buffer Design and Layout (TTRA and other buffers)
- BMP 13.16 Stream Channel Protection
- BMP 14.6 Timing Restrictions for Construction Activities
- BMP 14.14/ 14.17 Bridge and Culvert Design and Installation (fish passage, etc.)

Best management practices were monitored on 210 harvest units monitored on 165 forms and 71 road sites monitored on 65 forms during FY 2000. The following table shows the number of linear feet of stream channel protected and the approximate number of stream buffer acres retained.

Table 2.6 — Linear Feet and Acres of Stream Channel Protected and Lakes in FY 2000.

Stream Class	Linear feet of Stream Channel Protected	Approximate Acres Retained as a Streamside Buffer
Class 1	68,369 feet	259.41 acres
Class 2	28,407 feet	26.93 acres
Class 3 buffered	94,307 feet	75.89 acres
Class 3 un-buffered	38,478 feet	
Class 4	42,131 feet	
Protection Class A (not specified by stream class)	14,854 feet	31.89 acres
Protection Class B (not specified by stream class)	4,580 feet	3.5 acres
Protection Class C (not specified by stream class)	3,650 feet	2.15 acres
Lake Class 1	1,825 feet	13.24 acres

The table below shows the number of times the BMPs specific to riparian areas were monitored and BMPs were implemented.

Table 2.7 — BMPs Implemented in FY 2000

BMPs Applied	Number of Times the BMP was Appropriate for Use	Number of Departures from full BMP Implementation	Number of Times Corrective Implemented
12.6/ 12.6a	95	1 (1%)	5 (5%)
13.16	131	2 (2%)	5 (4%)
14.6	43	0	0
14.14/ 14.17	56	2 (4%)	0
Totals	325	5 (2%)	10 (3%)

Summary information about the monitoring and specific results from FY 2000 is included in Soil and Water Question 3. Descriptions providing details on the events that occurred during BMP implementation in unit harvest and road construction are included in the BMP Implementation Monitoring Report, IMEG IDT 2000 Trip Monitoring Reports, and IMEG IDT Monitoring Report – Hoonah Ranger District, in the Appendix.

After reviewing these results, the following implementation notes were made in FY 2000 and emphasis is recommended for FY 2001.

Successful implementation of <u>BMP 12.6/ BMP 12.6a, Riparian Area Designation and Protection and Buffer Zone Design and Layout</u> as well as <u>BMP 13.16 Stream Channel Protection</u> was accomplished through the diligent work of the sale administrators and fish biologists working together to ensure that the streams were correctly identified on the ground and protective measures implemented. In several cases, the streams were not correctly identified on the sale area maps nor identified properly in the environmental documents. The sale administrators worked with the fish biologists to identify the streams and add or remove buffers or other protective measures where necessary. Emphasis needs to be focused on correct identification of streams in the environmental assessment and layout phases of unit harvest. A few problems resulted from trees that were felled into buffers and/or streams. In these cases, the sale administrators took action to have tree debris and logs removed from the stream channels. The sale administrators took contract action to ensure this violation did not continue and that the debris were removed with minimal impact to the stream channels.

Successful implementation of <u>BMP 14.14/14.17 Design and Installation of Bridges and Culverts</u> was accomplished through the professional expertise of the engineers and fish biologists designing and overseeing installation of bridges and culverts that provide fish passage. Most of the work completed was

culvert and bridge replacement work associated with improving the structures to provide fish passage as well as hydraulic function. These culverts were generally designed following guidelines to provide fish passage with low gradient slopes, minimum channel constriction, and outlet pools. The engineers worked with Forest and ADF&G fish biologists to gain site concurrence for design and installation.

Some problems were identified in naturally turbulent streams, channels with shallow bedrock, and streams with relatively high natural channel gradients. These channels did not provide the configuration that was easily adapted for installation of low-gradient culverts. In these channels, the installation of low-gradient culverts resulted in significant channel erosion and down-cutting in the channel; this, in turn, contributed to creating channels that are impassable to all fish species during all life stages during the required flow window. Emphasis is focused on detailed site investigation and design on steeper gradient and high turbulent channels. Site simulation design is recommended rather than application of standard design mechanisms. Installation emphasis continues to focus on minimum channel constriction and outlet pools, as well as on rock placement in low-gradient culverts. Recommendations also include installation at moderate to low flows to ensure anticipated hydraulic function.

Evaluation of Monitoring Results

Best management practices are being successfully implemented on the Tongass National Forest. The high quality work of the individuals involved with preliminary site investigations, layout, unit and road design, environmental assessment, contract preparation, and contract administration has been reflected in the successful identification of streams and implementation of protective measures in units and effective culverts.

The diligent work of the sale administrators to note and work with other specialists to correct stream identification problems has contributed significantly to successful implementation of the fish habitat best management practices. Emphasis needs to continue on correcting any improperly identified or missed streams. Specific focus should be placed on correctly identifying streams during the early stages of layout and site investigation.

The effective work of the engineers has contributed to the successful implementation of the best management practices associated with culverts and bridges. Emphasis needs to continue on site-specific designs for steep gradient channels, channels showing turbulent flow, and shallow bedrock. Specific site investigation and stream simulation design techniques are recommended for these sites. Continued emphasis needs to be placed on stream identification relative to habitat and barriers so that fish passage can be evaluated.

The linear feet of stream channels protected and buffers implemented (and documented in the implementation monitoring process) were significantly higher than the amounts reported in FY 1999 and FY 1998. This reflects the difference in the location of the units, the number of units, and the monitoring process. A significant number of units were located adjacent to streams or had streams transecting the units. In 1998, streams adjacent to the unit but outside the unit boundary were frequently considered outside the unit and the buffers were not documented during the implementation monitoring process. In FY 2000, these streams were monitored. The implementation of the new standards and guidelines on streams has also contributed to increase the lineal feet and acres of stream protection documented this fiscal year.

Fish Habitat Question 3: Are Fish and Riparian standards and guidelines effective in maintaining or improving fish habitat?

The Tongass is currently in the process of combining several of the protocols and monitoring activities associated with fish and riparian issues. A summary of the fish and riparian activities is included below.

Fish and Riparian Synthesis Summary

The fish and riparian synthesis process was initiated to evaluate and combine some of the various aspects of fish, fish habitat, water, soil, and wetland monitoring. The specific intent of this effort was to develop a strategy to minimize overlap of the various monitoring efforts.

Case study watersheds are areas where intensive monitoring would be completed. The fish, soil, and water resources would be monitored in these watersheds to establish a status of the watershed condition. Recommendations for the case study watersheds include selection of three sets of watersheds in different geographic areas. Each set would include three watersheds:

- Pristine control watershed;
- Pristine watershed with planned future management;
- Watershed with past management and planned future management.

The group has established case study watershed criteria consisting of watershed size, coho habitat, stream barriers, harvest management, road density, and geographic location. The highest priority criterion is the evaluation of coho production potential. Considering this criterion, the group will employ channel type multipliers to identify miles of stream that produce more than 10,000 to 12,000 smolt. Currently the group is collecting GIS data and analysis information to define case study watersheds.

Discussion

The fish and riparian synthesis process will combine various aspects of effectiveness monitoring (fish habitat, buffer, wetland, and soil and water effectiveness), fish management indicator species, and implementation monitoring (soil and water, fish habitat, and wetland implementation monitoring). This process will include revision of the various protocols to ensure the monitoring will be objective, consistent, and completed applying scientifically viable methodologies.

The interagency group is working on the synthesis. This group includes members from ADF&G, NMFS, FSW, EPA, and the Forest Service (PNW, Region 10, and the Tongass National Forest). The synthesis group leaders are refining a strategy for completion of the synthesis process. Specific definition and selection of the case study watersheds is underway. Some protocols are complete and these protocols are at various stages of interagency review. Field work has been initiated on the resident fish part of the synthesis and is anticipated to expand to include anadromous fish in fiscal year 2001.

The synthesis process is in the strategic development and protocol completion stages. Listed below is the general status of the fish and riparian synthesis protocols:

- Fish MIS resident fish protocol is complete.
- Anadromous fish protocols are under development.
- Landslide draft protocol is complete.
- Wetlands effectiveness and validation studies underway potentially could be utilized and expanded.
- Aquatic Habitat: Buffer effectiveness and channel condition assessment protocols are combined. Protocol is complete.
- BMP implementation protocol is complete; monitoring is ongoing.
- Road condition survey protocol is complete.
- Buffer stability protocol is complete, and monitoring is ongoing. Expanded application to karst and silviculture.

Fish Habitat Question 3 (Are Fish and Riparian standards and guidelines effective in maintaining or improving fish habitat?) is answered through the following four monitoring projects:

- Stream buffer stability;
- Stream buffer effectiveness;
- Channel condition assessment;
- Fish passage.

Stream Buffer Stability

The vegetation inherent in riparian buffers is recognized as an important controlling factor and component in maintaining the natural range and frequency of aquatic habitat conditions. The Tongass Land Management Plan contains several riparian standards and guidelines that are intended to retain the integrity of streamside buffers. These include: 1) maintain natural and beneficial quantities of large woody debris (LWD) over the short and long term, 2) maintain stream banks and stream channel processes, 3) provide for the beneficial uses of riparian areas by maintaining water quality, and 4) maintain optimum salmonid stream temperatures. By retaining riparian vegetation in a condition found within the range of natural variability, it is anticipated that these standards and guidelines can largely be achieved.

Windthrow is a natural and important phenomenon of Southeast Alaska. It recycles forest stands, and maintains and renews the forest ecosystem. However, timber harvest has the potential to exacerbate the rate of windthrow in adjacent forest stands, including riparian buffers, beyond that found within the natural range of variability. Monitoring the incidence of windthrow in riparian buffers will assess whether the buffers are retained in a condition found within the natural range of variability.

Monitoring Results

A protocol to monitor the incidence of windthrow in riparian buffers was developed in 1999 and is described in the *TLMP Monitoring and Evaluation Guidebook.* This protocol monitors the incidence of windthrow in all riparian buffers of Class I, II and III streams on the Tongass NF that are associated with timber sales consistent with the revised TLMP. The change in canopy cover, due to windthrow, is documented and measured using low-altitude digital still aerial photographs.

During 2000, 27 riparian buffers within 16 harvest units located on three ranger districts were selected for monitoring, and pre-windthrow baseline conditions were documented. Ten of the stream buffers are adjacent to fish streams (Class I and II), while the remaining 17 stream buffers are adjacent to high-gradient (Class III) streams (see Table 2.8). The 27 designated riparian buffers are all the buffers prescribed under the revised TLMP; allt are associated with harvest units harvested during 2000 but prior to late September 2000.

In 1999, 19 stream buffers were selected for monitoring but data was not collected. The aerial photographs required for documentation of baseline conditions were not obtained due to unusually poor weather conditions and problems with fixed-wing aircraft availability. These buffers were not included in the sample population because pre-windthrow conditions were not obtained. In 2000, technology was developed that allowed a Hughes 500 helicopter to be equipped with the photographic equipment. This not only helped to alleviate problems associated with poor weather and aircraft availability, but it also increased photographic resolution and spatial accuracy.

Table 2.8 — Riparian Buffers Selected for Monitoring Windthrow

Ranger District	VCU	Harvest Unit	Buffer	Timber Sale	EIS/EA	Stream Class	Process Group
Petersburg	437	138	A	Dakota	South Lindenburg	III	HC
	437	138	B	Dakota	South Lindenburg	II	PA
	420	46	A	Crane/Rowan Mt.	Crane/Rowan Mt.	III	HC
	420	47	A	Crane/Rowan Mt.	Crane/Rowan Mt.	III	HC
	420	48	A	Crane/Rowan Mt.	Crane/Rowan Mt.	III	HC
	421	49	A	Crane/Rowan Mt.	Crane/Rowan Mt.	II	-
	421	49	B	Crane/Rowan Mt.	Crane/Rowan Mt.	III	HC
	421	50	A	Crane/Rowan Mt.	Crane/Rowan Mt.	III	HC
	421	51	A	Crane/Rowan Mt.	Crane/Rowan Mt.	III	HC
Wrangell	479	9a	A	Nemo Loop	Nemo Loop	III	HC
	479	9a	B	Nemo Loop	Nemo Loop	III	HC
	479	9a	C	Nemo Loop	Nemo Loop	III	HC
	479	9a	D	Nemo Loop	Nemo Loop	III	HC
	479	9b	A	Nemo Loop	Nemo Loop	III	HC
	479	9b	B	Nemo Loop	Nemo Loop	III	HC
	479	13	A	Nemo Loop	Nemo Loop	III	HC
	479	13	B	Nemo Loop	Nemo Loop	III	HC
	479	13	C	Nemo Loop	Nemo Loop	III	HC
	479	15	A	Nemo Loop	Nemo Loop	III	HC
	477	2	A	Turn Small Sale	Turn & Etolin	II/III	AF/HC
	477	3	A	Turn Small Sale	Turn & Etolin	II/III	AF/HC
Thorne Bay	578	401	A	Control Center	Control Lake	I	LAKE
	578	401	B	Control Center	Control Lake	I	PA
	578	401	C	Control Center	Control Lake	I	PA
	578	404	A	Control Center	Control Lake	I	FP
	578	404	B	Control Center	Control Lake	I	PA
	597.2	417	A	Control Center	Control Lake	I	FP

Evaluation of Results

Analysis of the incidence of windthrow in stream buffers will not be available until 2001, following the re-sampling of the buffers one year after harvest. Post processing has begun on the digital photographic images that were obtained this year. This includes filing and geo-referencing the images, defining Riparian Management Areas and Reasonably Assured Windfirm Management Areas, and calculating individual tree canopy area.

Photo: Low altitude digital still aerial photograph of riparian buffer

Stream Buffer Effectiveness

Monitoring Results

Due primarily to personnel constraints and other priority projects, no re-surveys of post-harvest buffer effectiveness sites, or surveys of new sites were conducted in 2000. Currently there are 25 permanent reference buffer effectiveness reaches/sites along timber sale unit boundaries located throughout the Tongass. These reference reaches are Class I or II streams in six stream channel process groups. Baseline data has been collected. Five sites have been re-surveyed subsequent to (pre-TLMP Revision ROD) harvesting activities.

Completion of reports for two Hoonah Ranger District sites has been postponed to 2001 due to other priority projects. These two sites are in Class I streams with two to three years of post-harvest (pre-TLMP Revision ROD) survey data. This case study is focusing on changes in:

- Number and size of pools;
- Number of large woody debris pieces;
- Cross-section (width-to-depth ratios) and longitudinal profiles;
- Substrate particle size distributions.

Channel Condition Assessment

TLMP clearly recognizes the need for monitoring aquatic habitat condition to determine the effectiveness of the Plan's standards, guidelines, and strategies. The PNW Research Station, with support from the TLMP Follow-on Studies Program, is developing and testing protocols for monitoring physical stream habitat condition and the response of salmonid species density, species distribution, and size distribution to physical conditions. The Tongass National Forest is further contributing to this effort by applying our test protocols in their ongoing effectiveness monitoring program, thereby contributing valuable data to the

study. This study builds upon fundamental research investigating the sensitivity of physical variables to land use effects (Woodsmith and Buffington, 1996) and trial application of these findings by Woodsmith and Geier in 1995 and 1996. A cumulative effects approach is taken; study reaches are limited to low gradient, depositional channels, which respond to and retain the signature of many natural and land management-related disturbances throughout the watershed. The biologic component of this study provides a link between the physical measurements, habitat complexity, and the response of salmonid populations.

Goals and Objectives

The goal of these studies is to develop and test protocols to monitor both physical and biological response of aquatic habitat in floodplain channels to TLMP watershed management practices. These protocols will require a level of objectivity, consistency, and repeatability not previously found in stream or habitat surveys on the Tongass National Forest. Successful protocol development will enable Forest Service managers to document existing conditions, and the natural range of channel and habitat conditions and processes, and to determine whether streams in areas experiencing management activities have become degraded. Sampling in a number of unmanaged streams allows us to establish the central tendency and variation of habitat characteristics and populations commonly regarded as desirable standards. An important component of this work is testing the hypothesis that unmanaged and managed conditions can be discriminated well enough to clearly establish desirable standards. Design and analysis of the protocols includes links between effectiveness monitoring of physical habitat and salmonid populations.

The objectives and hypotheses for both the physical (hydrology and stream channel morphology) and the biological (salmonid populations) components from the study plan are listed below.

Physical:

1. On the basis of previous research (Woodsmith and Buffington, 1996) and experience, determine which variables are most likely to be successful indicators of changes in physical and biological condition of aquatic habitat.

2. Develop initial study designs that test these variables as indicators of management effects.

3. Develop effectiveness monitoring protocols based on evaluation of study results and propose adoption of these protocols as a standard subject to further modification as more data become available.

4. Assess observer and other measurement errors by repeat sampling in several reaches with a second, independent crew. An accurate assessment of these sources of variability is essential to the meaningful interpretation of monitoring results and the distinction of apparent from real change in channel condition parameters.

Biological:

1. Density of salmonids will increase with increasing pool frequency. This effect will be tested among stream reaches and among streams. Where Fd_i = density of fish in reach i; and Pf_i = pool frequency in reach i, then H_o: $b = 0$ where $Fd_i = a + b*Pf_i$. Pool frequency variables will be obtained from morphological measurements. Fish population data will be obtained concurrently during reach surveys.

2. Density of salmonids increases with LWD frequency. This effect will be tested among habitat units and stream reaches. Where LW_i = number of pieces of large wood * m^{-1}, then H_o: $b = 0$ where $Fd_i = a + b*LW_i$. Large wood measurements will be obtained during reach surveys concurrently with fish population estimates.

3. Larger pools will support larger fish. This hypothesis will examine the effect of individual pool size (area and depth) on the size and age class of fish in each pool within the sample reach. The ratio of the reach-

averaged residual pool depth to reach-averaged bankfull depth (h_r / h_{bf}) will be used as one measure of pool size for this hypothesis. A second variable, the ratio of pool area (P_a) and residual pool depth (h_r) will be used to compare the distribution of size and age class of fish.

4. Species distribution will change from headwaters to floodplain, with cutthroat trout more abundant in the headwater streams and Coho salmon (age 1+) more abundant in the flood plain channels. Channel types will be used as the discriminate variables for this hypothesis. Moderate constrained channels (MMC) will be used to represent more headwater reaches, and floodplain channels (FP) will be used to represent floodplain channels. The ratio of cutthroat density (Ct_d) to Coho salmon density (Co_d) -- Ct_d/Co_d -- will be compared between the two channel types across reaches and among streams.

5. Density of fish differs by pool type and pool complexity. Two pool types at the meso-unit level (Bryant et al., 1992) will be compared: backwater and scour. Large wood volume and residual depth in each pool will be used as a measure of pool complexity. Density of fish, stratified by species and size, will be correlated to the two complexity variables with pool type as discriminate variables.

Research and Monitoring Results

The emphasis of the past three years of work has been on data collection and obtaining a range of samples that includes the major geographic areas of Southeast Alaska from north to south (Table 2.9). Single channel floodplain reaches were selected as the focus of the study to increase the probability of detecting differences (larger effect size) and to increase the statistical power of the sample size. Our focus on low-gradient, depositional channels, which respond to and retain the signature of many natural and land management-related disturbances throughout the watershed, is a cumulative effects approach. Preliminary data analysis has been completed in some aspects of the study to determine the adequacy of the sample plan, to test methodologies, and to further develop hypotheses. This has allowed adjustments to some of the original objectives and verification of sample methodologies. In 2001, data will be analyzed and draft results will be available.

The restriction of the sample plan to floodplain channels has resulted in the deletion of objective 4 in the biological studies. Preliminary data analysis of salmonid populations has indicated that an examination of the hierarchical variability of salmonid populations among habitat units, reaches, and watersheds is important to determine response to physical factors. Additions to the protocol of variables, such as riparian stand density, have been made as the study progresses.

Biological data have centered on the dynamics of salmonid populations in floodplain reaches. These include estimates of population abundance at the pool scale within sampled reaches. Habitat measurements, using modified tier II protocols, are collected in conjunction with population estimates at the habitat unit scale. Measurements include species distribution, length frequency distribution, and size and age measurements of salmonids within the reach. Estimates of population densities at the reach scale will be compared with reach scale variables measured by the geomorphology studies. Analysis of fish densities and habitat will be completed at the habitat unit scale and at the reach scale.

Table 2.9 – Number of Sample Locations and Reaches Through Year 2000

Location	Channel Morphology		Salmon Populations	
	No. of Streams	No. of Reaches	No. of Streams	No. of Reaches
North Tongass	10	21	4	10
Central Tongass	4	7	2	2
South Tongass	28	43	6	9
Total	42	71	12	21

Evaluation of Results

Mark-recapture methods commonly used in small tributary streams could not be used to obtain reliable and precise fish population estimates in the larger (3rd to 4th order) floodplain reaches. Depletion methods offered one solution, but electro-fishing, which is commonly used to obtain estimates for this method, has not been effective in the larger Southeast Alaska streams. A method using minnow traps was developed and tested (Bryant in press). The method uses three to four trapping occasions of about 90 minutes each. The method has been adopted for various monitoring activities throughout the Tongass such as monitoring of resident cutthroat trout and Dolly Varden (Richard Aho, personal communication). Preliminary analysis of the coho salmon parr (age 1+) and reach scale habitat measurements showed a significant relationship between pools/1000m and density ($n=6$; $p=0.016$) and average residual depth and density ($n=6$; $p=0.0082$).

Results to date indicate that the habitat assessment protocol is objective, consistent, and repeatable when carried out by well-trained crews. Our methods are effective at detecting change in habitat condition as described by pool frequency, pool depth, and median surface grain size. Additional variables, such as channel width-to-depth ratio, relative roughness, and large woody debris loading, are included in the data set, and will be assessed to determine their sensitivity to management effects. We will also test the success of discrimination of distinct habitat conditions along a gradient of management intensity. This will address the defensibility of fixed habitat condition standards.

Land use intensity is not the only variable affecting stream channel habitat; other factors such as geology, climate, glacial history, riparian stand condition, disturbance history, and watershed size are also important. Therefore, much variability in habitat condition is evident, even among channels of similar type and land use history. Our ability to distinguish effects of natural from management-related disturbance will be enhanced in basins where knowledge of watershed processes, conditions, and disturbance history at the appropriate scale is available. Such a watershed condition framework, in combination with results from this study, will insure that interpretation of measured change or lack of change considers processes and conditions occurring throughout the watershed.

References

Bryant, M.D. 2000. Estimating fish populations by removal methods with minnow traps in Southeast Alaska streams. North American Journal of Fisheries Management. 20:923-930.

Bryant, M.D., Wright, B.E., and Davies, B.J. 1992. Application of a Hierarchical habitat unit classification system: stream habitat and salmonid distribution in Ward Creek, southeast Alaska, 'Research Note PNW-RN-508', Portland, OR, U.S.D.A., Forest Service, Pacific Northwest Research Station, 18 pp.

Woodsmith, R.D. and Buffington, J.M. 1996. Multivariate geomorphic analysis of forest streams: implications for assessment of land use impacts on channel condition, 'Earth Surface Processes and Landforms,' 21:377-393.

Fish Passage

Upstream Passage of Juvenile Fish at Road Crossings

Migration is essential for many fish species on the Tongass National Forest. Anadromous fish (fish that migrate from the ocean to freshwater to spawn) require access to spawning habitat. Juvenile anadromous fish migrate during their freshwater life stage, seeking seasonal habitats. Resident fish (fish that spend their entire life in freshwater) also may migrate seasonally in response to food, shelter and spawning needs.

Providing for fish passage at stream and road intersections to ensure fish migration is an important consideration when constructing or reconstructing forest roads. Improperly located, installed or maintained stream crossing structures can restrict these migrations, thereby adversely affecting fish populations. These structures can present a variety of potential obstacles to fish migration. The most common obstacles are excessive vertical barriers, debris blockages, and extreme water velocities that inhibit fish passage.

The Tongass Land Management Plan (TLMP) provides criteria to be used to assess fish passage. TLMP specifies different fish passage standards for Class I streams (i.e., streams with anadromous or high quality resident fish habitat, or adfluvial fish habitat) than for Class II streams (i.e., usually small, high-gradient streams with resident populations of cutthroat trout and Dolly Varden char).

For Class I streams, standards state that juvenile coho will have unrestricted upstream passage within a defined range of stream flows. The stream flow at the upper end of this range is the stream flow that exists two days before and two days after a peak flow. The peak flow that is used is the flow that statistically recurs about once every two years and is known as the mean annual flood. This upper limit stream flow, or "fish passage design flow," is unique for each stream since it is based upon the specific hydrologic characteristics of that stream. The fish passage design flow can be expressed as a Q_2-4 day duration stream discharge. Q_2 refers to the mean annual flood discharge and the four-day duration refers to the two-day period before and after the Q_2 (Figure 1, below). This design flow requirement is different from the Alaska Coastal Management Program standard that requires fish passage at a Q_2-4 stream discharge. It is anticipated that this inconsistency will be corrected in cooperation with the ADF&G.

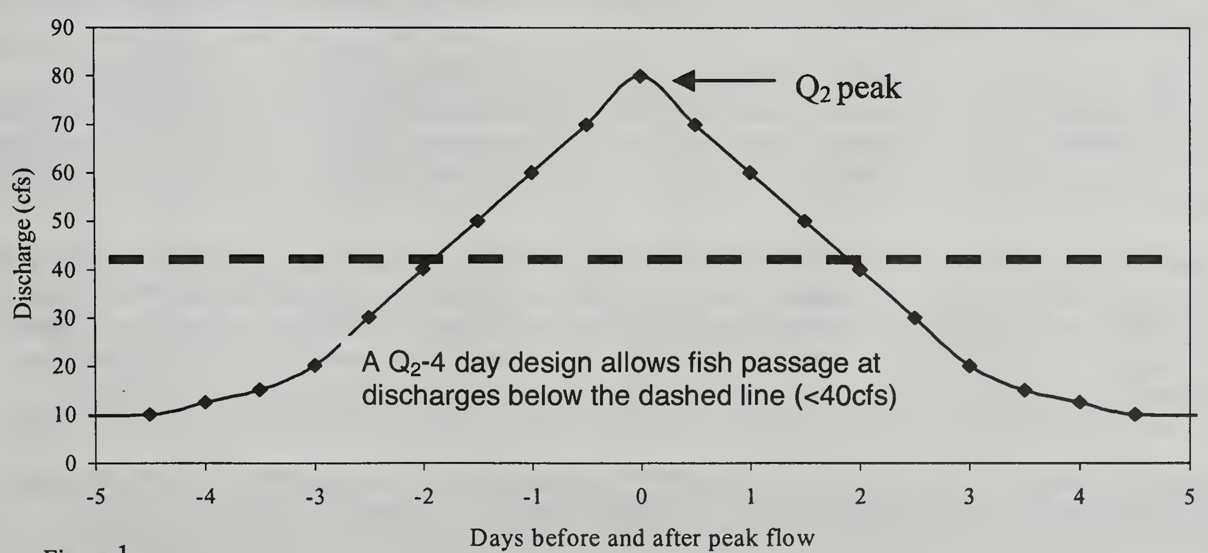


Figure 1

Figure 1 illustrates a hypothetical hydrograph that shows the relationship of time to stream discharge. The Q_2 peak is the highest discharge on the graph, and the dashed line indicates the discharge two days before and two days after the peak (i.e., the fish passage design flow). In this example, the Q_2 peak is 80 cubic feet per second (cfs) and the discharge at two days before and after this peak is 40 cfs. Therefore, the design flow is 40 cfs, which implies that a specified fish will be able to pass through the culvert at stream flows up to that amount.

For Class II streams, fish passage should generally be provided except for the occasional instance where it is not feasible to provide unrestricted passage to short sections of habitat. If fish passage is restricted, a feasibility analysis must be conducted in conjunction with ADF&G that includes the cost and feasibility of providing unrestricted fish passage while considering sensitive or unique fish populations, cumulative impacts on fish passage in the watershed, and the stream linkages to the watershed. In addition, a Clean Water Act 404 permit will be obtained in instances where fish passage is restricted. TLMP recognizes that fish passage will be restricted in some limited situations on Class II streams. This restriction would typically occur in high-gradient streams that contain short sections of habitat upstream of the road crossing. It is in these streams that the cost of providing fish passage is high and fisheries value is low.

The design species for fish migration in Class II streams varies between fish species and different life stages, depending on the stream process group and the species present. A design flow for fish passage is not specified.

Monitoring Results and Evaluation

Determining the effect of drainage structures on fish migration is a difficult process. It involves a great deal of complexity and variability, and the knowledge and tools to assess fish passage are evolving. Since actual fish passage is difficult to measure, most of the current fish passage work has been in developing a model to predict fish passage in the design of stream crossing structures under different stream conditions.

The model is based upon many assumptions in assessing fish passage capability. These assumptions pertain to stream hydrology, culvert hydraulics, fish swimming abilities, and migration needs. The validity and significance of the results reported are only as good as the assumptions used to derive them. These assumptions need to be tested and verified in the field in Southeast Alaska. In the coming years, more information will be forthcoming that will allow for improved confidence in the assumptions and estimates. The model needs to be tested against TLMP fish passage criteria and compared against other fish passage criteria relative to the Coastal Zone Management Act, Clean Water Act, and the FS-ADF&G MOU Regarding Fish Habitat and Passage.

Much progress has been made in the last three years in the development of a modeling process to evaluate the capability of fish passage at road crossings. This process is described in the *Monitoring and Evaluation Guidebook for the Tongass Land and Resource Management Plan*. To date, insufficient data currently exists to adequately assess the effectiveness of TLMP fish passage standards and guidelines to this model.

Along with the ongoing model development, an inventory of all fish streams along specified forest roads on the Tongass National Forest is nearly complete. This inventory is part of the road condition survey. All fish streams are systematically located and information regarding fish species, drainage structure and stream characteristics is obtained. This new inventory information, along with a model containing field-verified assumptions, will enable us to better evaluate fish passage capability against the TLMP standards and guidelines.

The state of knowledge about juvenile fish movement and passage through culverts is improving and much is known (e.g., Juvenile and Resident Salmonid Movement and Passage through Culverts, Washington State DOT, July 1998, Thomas Kahler and Thomas Quinn). The work done so far has identified a need for more information in several areas. More information is needed to assess the ability of juvenile coho to pass through structures at different steam flows. We need to assess fish swimming capability in natural field conditions to verify the assumptions used in the mathematical predictions. More information is needed on the migration timing of juvenile fish, and the design flow requirements of both

adult and juvenile fish. Both the Forest Plan (Q_2-4 day duration) design flow and the Alaska Coastal Management Program standard (Q_2-2 day duration) are based on very limited research and data. The Alaska Coastal Management Program standard is based on passage requirements of the Arctic Grayling, a species not native to Southeast Alaska. Whether this is an appropriate standard for anadromous and resident fish of Southeast Alaska remains a question. More knowledge is needed on the biological implications of a delay in fish migration. There is a need for more information on the migratory behavior of Dolly Varden and cutthroat trout that reside in high gradient headwater streams.

An administrative study investigating the migratory behavior of Dolly Varden and cutthroat trout in headwater streams will begin in 2001. This study will relate fish movement with time of the year, stream stage and size of fish. Understanding these relationships will allow for an informed decision on culvert design flow standards that will provide unimpeded passage for these species.

Fish passage standards and guidelines have evolved over time. Therefore, the assessment of the effectiveness of the standards and guidelines contained in the current TLMP can only be meaningfully conducted on drainage structures designed and installed as designed since the effective date of the revised TLMP (May 23, 1997). Currently, data collection for the assessment of fish passage along recently reconstructed roads is incomplete but an assessment has been done on recent new roads. A total of 10.2 miles of permanent road has been constructed on the Tongass National Forest that is associated with EISs or EAs that were required to be consistent with the current TLMP. Only one road (50034, Wrangell R.D.) has Class I or Class II stream crossings identified along its route. The four drainage structures located in fish streams have been removed and the natural stream course has been restored. All newly constructed roads are scheduled to be placed in storage (Maintenance Level I) upon completion of current timber harvest activity with the exception of 1.2 miles on Road 50034. There are no fish streams inventoried along the section of road that will remain open. Currently, 6.4 miles of road have already been placed in storage and all culverts have been removed. The remaining 2.8 miles of road are scheduled to be placed in storage (Table 2.10).

Table 2.10 – Fish Passage Capability on Newly Constructed Classified Roads [1/]

District	E.I.S. or E.A	Classified Road	Length (miles)	Class I Stream Crossings	Class II Stream Crossings	Post Project Maintenance Level	Current Maintenance Level
Petersburg	Crane/ Rowan	46360	2.4	0	0	1 (storage)	1 (storage)
Petersburg	Crane/ Rowan	46154	0.5	0	0	1 (storage)	1 (storage)
Petersburg	Crane Rowan	46152	2.0	0	0	1 (storage)	1 (storage)
Thorne Bay	Control Lake	3013005	0.3	0	0	1 (storage)	1 (storage)
Thorne Bay	Control Lake	3013070	0.5	0	0	1 (storage)	2 (open)
Thorne Bay	Control Lake	3015400	1.3	0	0	1 (storage)	2 (open)
Thorne Bay	Control Lake	2030127	1.0	0	0	1 (storage)	2 (open)
Wrangell	Turn & Etolin	50034	2.2	0	4	M.P. 0.0 - 1.2 2(open) M.P. 1.2 – 2.2 1(storage)	M.P. 0.0 - 1.2 2(open) M.P. 1.2 – 2.2 1(storage)

1. Roads included are those associated with EIS's or EA's that are required to be consistent with the current TLMP.

Work is continuing to revise and refine the monitoring protocol and to inventory the stream crossing structures. Any fish passage problems are being identified and scheduled for correction in order to ensure fish passage to TLMP standards.

Special Supplemental Assessment of the Upstream Passage of Juvenile Fish at Road Crossings

The intent of the previous section is to provide an evaluation of the effect of current drainage structure design and implementation practice upon fish passage. The intent of this supplemental section is to provide an evaluation of the current fish passage capability status of all drainage structures regardless of their date of design and installation. Standards and guidelines for the installation of drainage structures in fish streams have become more stringently defined through time, and fish passage needs, particularly for juvenile fish, have become better understood. Therefore, this supplemental assessment is not intended to directly address the effectiveness of the current TLMP fish passage standards and guidelines.

This supplemental report uses the fish passage capability model and assesses mostly older drainage structures designed and installed prior to the effective date of the current TLMP. However, Forest Plan standards and guidelines do acknowledge the need to restore and improve the opportunities for fish passage through drainage structures regardless of when they were designed and installed. The results of this supplemental report are intended to be used to prioritize drainage structures for more intensive investigation, leading to a more reliable evaluation of the structures' fish passage capability at the design flow. Following more intensive investigation, the structures identified as not meeting current juvenile fish passage design flow standards are scheduled for corrective action. This assessment also provides a base from which future progress toward fish passage restoration can be tracked.

<u>Methods</u>

The standards against which fish passage capability is evaluated in this report are similar to those explained in the previous section, with the exception of the design flow. TLMP states a Q_2-4 day design flow as a standard while this assessment uses a set of assumptions based on a more stringent, conservative design flow of Q_2-2 day as the standard. The Q_2-2 day design flow was used to be more conservative and because it is the design flow stipulated by the State of Alaska under the authority of the Alaska Coastal Management Program. The Alaska Coastal Management Program enforceable standards require that "structures shall be designed, installed and maintained to accommodate the efficient passage and movement of fish, both upstream and downstream, at all flows up to and including a mean annual seasonal flood design discharge with a two-day duration for the specific time of the year that the weakest swimming fish (design fish) present in the waterbody must be assured passage. The ADF&G is responsible for identifying the design fish and the seasonal period for calculation of the fish passage design flood."

The data for stream crossing drainage structures that are assessed in this report were obtained from the most recent Alaska Region Road Condition Survey (FSH 7709.58-99-2), including data collected during the summer of 2000. One of the objectives of the survey is to locate and characterize all the drainage structures within fish streams on the Tongass National Forest. This survey is ongoing and all fish stream crossings have not been located or characterized to date. There are approximately 3,600 miles of classified or permanent road on the Tongass National Forest. To date, more than 90 percent of the permanent road has been surveyed. This report assesses the fish passage capability of all fish stream road crossings currently and completely surveyed on permanent roads of the Tongass National Forest. This includes 536 Class I stream drainage structures and 911 Class II stream drainage structures. Nearly twice as many drainage structures are included in this analysis compared to a similar one done last year. Only streams that have had fish presence verified by sampling have been included in the analysis. Critical measurements required for fish passage assessment have not been completed on 154 (22 percent) of Class I streams and 378 (30 percent) of Class II streams. These streams were not included in the analysis. It is expected that obtaining the measurements will be a priority item in the coming field season.

The preliminary assessment of juvenile fish passage capability is based on a set of assumptions developed by an interagency group consisting of the ADF&G, Forest Service, and Alaska Department of Transportation and Public Facilities personnel. The set of assumptions is based on the best available information and is conservative. The assessment stratifies drainage structures by type, then establishes criteria thresholds for culvert gradient, stream constriction, debris blockage and vertical barrier specific for each stratified group (table 2.11).

Three threshold categories are established and each drainage structure is evaluated and placed in one of the three categories. The categories are defined as follows:

- **Green Category:** Conditions assumed to meet fish passage standard.
- **Red Category**: Conditions assumed not to meet fish passage standard.
- **Gray Category**: Additional analysis required to determine if structures are in the Green or Red Category. A computer software application (FishXing) is used to perform the additional analysis required to determine the status of the Gray Category structures. The additional analysis was not completed for this preliminary report.

Perch, or vertical barrier at the outlet of the culvert, was calculated as a flow dependent measurement and was derived by subtracting the elevation of the top of the water at the tailcrest, at the time of sampling, from the elevation at the bottom surface of the culvert outlet.

The ratio of a stream's bed width to culvert width was not used as a criteria for determining fish passage capability when palustrine channels were located immediately upstream of a culvert. This exception to the Fish Passage Evaluation Criteria was made due to the low stream gradient and slow water velocities associated with these types of streams.

As displayed in Table 2.11, approximately 21 percent of culverts that are installed in Class I streams and 9 percent installed in Class II streams have conditions that are assumed to allow unrestricted upstream passage of juvenile fish (Green Category). Approximately 30 percent of the culverts in Class I streams and 18 percent of the culverts in Class II steams require further analysis (use of FishXing software) to determine their status (Gray Category). Approximately 49 percent of culverts in Class I streams and 73 percent of culverts in Class II streams have conditions that are assumed to restrict the upstream movement of juvenile fish at some or all stream flows (Red Category).

Table 2.11 — Juvenile Fish Passage Evaluation Criteria Matrix. Values express the number of culverts in both Class I and Class II streams that are within each fish passage capability "Category" as stratified by "Structure Type." NOTE: These fish passage evaluation criteria are not culvert design criteria, because additional considerations to protect fish habitat may be required.

STRUCTURE TYPE	GREEN CATEGORY. Conditions assumed to meet passage standards for juvenile fish			GRAY CATEGORY Additional analysis required to determine status			RED CATEGORY Conditions assumed not to meet passage standards for juvenile fish		
	CRITERIA	Class I Streams	Class II Streams	CRITERIA	Class I Streams	Class II Streams	CRITERIA	Class I Streams	Class II Streams
Bottomless pipe arch OR countersunk pipe arch AND 100% bedload coverage.	Culvert span to bedwidth ratio of 0.9 to 1.0 AND no blockage.	9	12	Culvert span to bedwidth ratio of 0.5 to 0.9 OR blockage >0% but <=10%.	4	0	Culvert span to bedwidth ratio <0.5 AND blockage >10%	1	5
Countersunk pipe arches >=3x1 corrugation AND Bedload < 100% coverage.	Culvert gradient <0.5% AND no perch AND no blockage AND culvert span to bedwidth ratio > 0.75.	8	5	Culvert gradient between 0.5% - 2.0% OR perch >0.0' but <=4" OR blockage >0% but <=10% OR culvert span to bedwidth ratio between 0.5 to 0.75.	16	6	Culvert gradient >2.0% OR >4" perch OR blockage >10% OR culvert span to bedwidth ratio <0.5.	15	20
Circular CMP <= 48" span, AND spiral corrugations regardless of bedload coverage.	Culvert gradient <0.5% AND no perch AND no blockage AND culvert span to bedwidth ratio > 0.75.	26	33	Culvert gradient between 0.5% - 1.0% OR perch >0.0' but <=4" OR blockage >0% but <=10% OR culvert span to bedwidth ratio between 0.5 to 0.75.	22	49	Culvert gradient >1.0% OR >4" perch OR blockage >10% OR culvert span to bedwidth ratio <0.5.	100	427
Circular CMP's with annular corrugations > 3x1 and 3x1 spiral corrugations (>48" span), Bedload < 100% coverage.	Culvert gradient <0.5 % AND no perch AND no blockage AND culvert span to bedwidth ratio > 0.75.	11	10	Culvert gradient between 0.5% - 2.0% OR perch >0.0' but <=4" OR blockage >0% but <=10% OR culvert span to bedwidth ratio between 0.5 to 0.75.	13	17	Culvert gradient >2.0% OR >4" perch OR blockage >10% OR culvert span to bedwidth ratio <0.5.	18	52
Circular CMP's with >= ½ x 2 2/3 corrugations (all spans) and 3x1 spiral corrugations (>48 span), 100% bedload coverage.	Culvert gradient <1% AND no perch AND no blockage AND culvert span to bankfull ratio > 0.75.	3	5	Culvert gradient between 1.0% - 3.0% OR perch >0.0' but <=4" OR blockage >0% but <=10% OR culvert span to bedwidth ratio between 0.5 to 0.75.	4	6	Culvert gradient >3.0% OR >4" perch OR blockage >10% OR culvert span to bedwidth ratio <0.5.	3	8
Baffled OR multiple structure installations.	N/A	-	-	All baffled OR multiple structure installations.	24	47	N/A	-	-
Totals Number and Percent of culverts		57 (21%)	65 (9%)		83 (30%)	125 (18%)		137 (49%)	512 (73%)
Bridges OR removed structures.	All bridges or removed structures are assumed to provide unimpeded passage.	259	209	N/A	-	-	N/A	-	-

[1] Habitat quality and quantity upstream of road crossing may not warrant providing fish passage at all structures in Class II streams.

Figures 2 and 3 illustrate the current status of juvenile fish passage assessment for both Class I and Class II streams that cross classified roads. In addition to culvert crossings, these figures include fish streams crossed by bridges and fish streams where the crossing structure has been removed and passage restored. Currently, 690 crossings have been identified and surveyed in Class I streams and 1,289 crossings have been identified and surveyed in Class II streams. In Class I streams, 38 percent of the crossings either are bridges or removed structures. In Class II streams, 16 percent of the crossings either are bridges or removed structures. It is assumed that fish passage is provided at these locations. Approximately 22 percent of the crossings in Class I streams and 30 percent in Class II streams have incomplete measurements and were not assessed for fish passage capability. Approximately 20 percent of the crossings in Class I streams and 39 percent in Class II are culverts and are classified as Red (conditions assumed not to meet passage standards). Approximately 12 percent of the crossings in Class I streams and 10 percent in Class II streams are culverts and are classified as Gray (additional analysis required to determine status). Approximately 8 percent of the crossings in Class I streams and 5 percent in Class II streams are culverts and are classified as Green (assumed to meet passage standards).

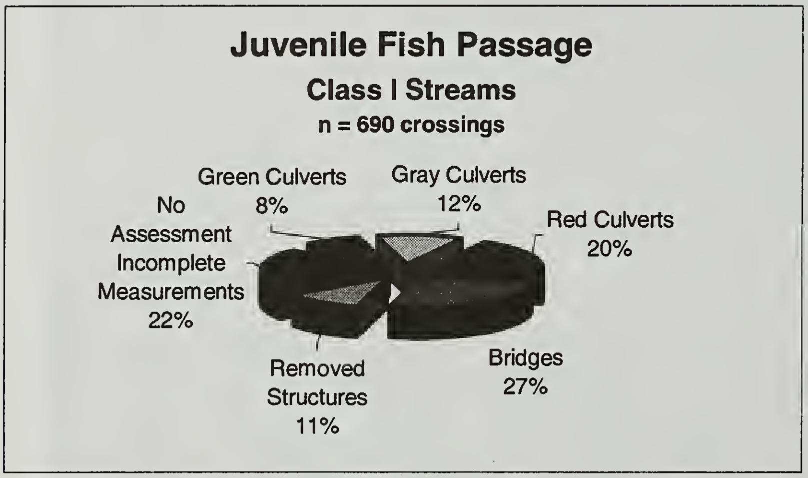


Figure 2. Preliminary evaluation of juvenile fish upstream passage at road crossings in Class I streams on the Tongass National Forest. Removed structures and bridges are assumed to provide passage.

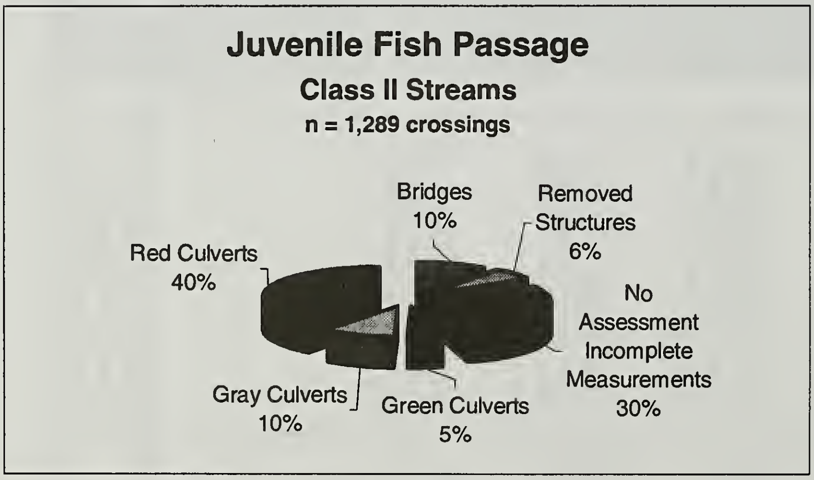


Figure 3. Preliminary evaluation of juvenile fish upstream passage at road crossings in Class II streams on the Tongass National Forest. Removed structures and bridges are assumed to provide passage.

Culverts that are in the Red category are assumed not to be providing juvenile fish passage at the design flow for one of four reasons or a combination of the reasons: 1) excessive stream constriction (leading to potentially excessive culvert water velocities in the culvert); 2) excessive culvert gradient (also leading to potentially excessive culvert water velocities in the culvert); 3) excessive culvert perch (creating a vertical barrier); 4) debris blockage within the culvert (Figures 4 and 5). Excessive culvert gradient is the most prevalent single reason that culverts in Class I and Class II streams are assumed not to provide passage at the design flow. Excessive culvert gradient explains the red category designation for 46 percent of the culverts in Class I streams and for 33 percent of the culverts Class II streams. A combination of the four reasons explains the Red category designation for 37 percent of the culverts in Class I streams and for 56 percent of the culverts in Class II streams. The remaining 18 percent of culverts in Class I streams and 11 percent of the culverts in the Class II streams are designated Red due to either a vertical perch, a constriction of the stream, or debris blockage.

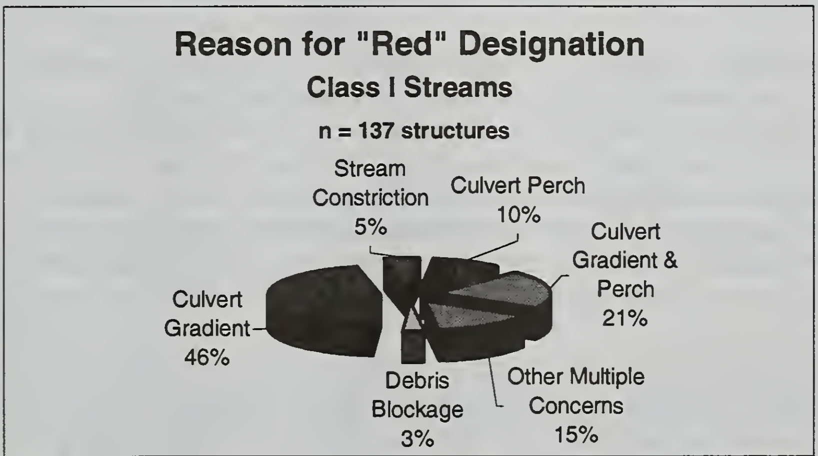


Figure 4. Reasons that culverts in Class II streams are assumed not to provide upstream juvenile fish passage at the design flow standard.

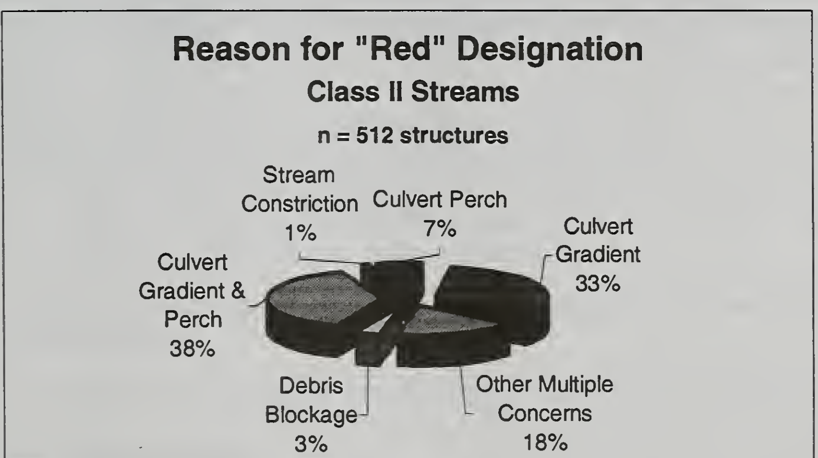


Figure 5. Reasons that drainage structures in Class I streams are assumed not to provide upstream juvenile fish passage at the design flow standard.

Discussion

It is important to note that fish are assumed to be able to pass through most of the culverts identified in the Red and Gray categories most of the year. Most of these culverts do have fish located upstream of them. We are mostly concerned that passage may not be possible for juvenile fish during periods of high stream flow. The results presented are for juvenile fish passage, and it is likely that stronger swimming adult fish are not restricted in most of the structures. The drainage structures assessed in this report for their consistency with current juvenile fish passage standards include drainage structures installed at various times with various fish passage design standards under the Forest Plan. Therefore, the results should not be necessarily interpreted to conclude that the reason for a specific structure not meeting the current standards is due to negligent structure design. This report is not an evaluation of the current management of the Tongass National Forest. It does not assess the effectiveness of TLMP standards and guidelines. It does provide a baseline of current but preliminary fish passage conditions that can be used to track the commitment and progress toward maintaining, restoring or improving the opportunities for fish migration on the Tongass National Forest.

There is currently an initiative toward maintaining, restoring and improving fish passage along Tongass National Forest roads. The initial inventory and survey of all fish streams and their fish passage conditions along Forest roads is nearing completion. Through the cooperation of an interagency group, a state-of-the-art fish passage assessment model has been developed and is being continuously improved. Improved standards for drainage structure design in fish streams are being developed. Study plans to better understand fish migration needs are being drafted. There is currently substantial funding available to correct fish passage problems identified through the survey and analysis process. In FY 2000, the Forest Service spent $264,000 to repair 23 culverts with fish passage problems. In FY 2001, an additional two million dollars will be spent.

In 2000, information was gathered on the quantity and quality of the fish habitat located upstream of approximately 150 drainage structures that are currently identified as fish passage concerns. In the coming year an even greater number of streams will be surveyed. With this additional information, a prioritization schedule for corrective action and feasibility analyses will be completed. It is a realistic expectation that in the near future most of the fish passage concerns on Class I streams and the lower gradient Class II streams will be resolved by providing corrective actions. It is believed that many of the structures in Class II streams that are assumed to restrict juvenile fish passage at design flows have very small amounts of poor fish habitat located upstream of them. It is anticipated that the fisheries resource concerns on many of these Class II streams will be resolved through an interagency analysis that compares project cost with fisheries values.

Heritage Resources

Goal: Identify, evaluate, preserve, protect and enhance heritage resources.

Objective: Protect heritage resources (as described in the Heritage Resources Forest-wide standards and guidelines).

Background: The Forest Plan provides guidance on maintenance of a heritage resource management program that identifies, evaluates, protects and enhances significant heritage resources. This guidance applies Forest-wide and on a project-specific basis pursuant to the National Historic Preservation Act, as amended, as well as other relevant acts and implementing regulations (including the Archaeological Resources Protection Act, the Native American Graves Protection and Repatriation Act and the American Indian Religious Freedom Act). The Forest Plan heritage resources standards and guidelines address:

- Project clearance/inventory;
- Project implementation;
- Mitigation;
- Enhancement.

The National Historic Preservation Act (NHPA) establishes a general framework for how federal agencies manage heritage resources. Section 106 of the NHPA requires the Forest Service to consider what effect an "undertaking" (project, activity or program funded in whole or in part under our direct or indirect jurisdiction) may have on heritage resources eligible for, or listed on, the National Register of Historic Places (National Register). When it is deemed necessary to complete a heritage resource inventory for an undertaking, archeologists usually check the condition of previously identified heritage resources within the project area. Section 110 of the NHPA directs federal agencies to assume responsibility for the preservation of heritage resources that are eligible for the National Register and owned or controlled by the agency. Each federal agency must establish a preservation program for the identification, evaluation, protection and nomination to the National Register of significant heritage resources. To the maximum extent feasible, each federal agency must use National Register eligible properties available to it in carrying out its duties.

Since July 1995, we have performed some of our heritage resource responsibilities under terms of a Programmatic Agreement (PA) with the Advisory Council on Historic Preservation and the Alaska State Historic Preservation Officer. The PA formalizes our compliance with Section 106 of the NHPA and includes site and project monitoring standards. PA standards call for monitoring of project areas either during or after project implementation to judge the effectiveness of current models that predict the heritage resource sensitivity of any given area of the forest. The PA expired September 30, 2000 and we are currently negotiating terms of a new PA that incorporates 1992 amendments to the NHPA (codified by new rules published at 36 CFR 800). One of the most notable regulatory changes is an enhanced role of Indian Tribes in the Section 106 consultation process.

Heritage Resources Question 1: Are Heritage Resources standards and guidelines being implemented?

The Forest Plan standards and guidelines are being implemented.

<u>**Monitoring Results**</u>

We evaluated 76 undertakings in fiscal year 2000 for their potential to affect heritage resources eligible to the National Register. Qualified professionals using accepted professional standards administer the heritage resource workload. Contractors and project administrators are aware of heritage resource requirements. Looting observed at a site near Rowan Bay suggests some sites are being damaged not directly as a result of project implementation, but as remote areas become more accessible.

The FY 2000 results of the implementation of the Forest Plan standards and guidelines for the Tongass National Forest are displayed as follows:

Projects Reviewed for Their Potential to Affect Heritage Resources	Projects Reviewed Under Standard 36 CFR 800 Procedures	Projects Requiring Mitigation Other than Avoidance	New Sites Located During Project Implementation	Site Enhancements
76	5	0	0	0

Project Inventory/Clearance

The standard consultation procedures outlined in 36 CFR 800 were followed for five undertakings (less than 7 percent of all reviewed projects) prior to the signing of a NEPA decision memo. For the remaining 71 projects we followed modified consultation procedures outlined in the PA with the Alaska State Preservation Officer (SHPO) and the Advisory Council on Historic Preservation.

Project Implementation

Qualified heritage resource specialists supervised all project evaluations and inventories. Forest Service archaeologists supervised most of these projects, while qualified contractors completed the remaining projects. Included in all heritage resource reports is a statement indicating that if a heritage resource site is identified during project implementation the work will stop in that area and an archaeologist and the District Ranger will be notified. No work shall proceed at this locality until the archaeologist has completed necessary documentation and consulted with the Alaska SHPO, and possibly other consulting parties (Advisory Council on Historic Preservation, Indian Tribes, local governments, etc.).

Mitigation

Avoidance of adverse effects is the preferred mitigation option for heritage resources on the Tongass National Forest. During fiscal year 2000 no projects required mitigation other than avoidance. The Tongass National Forest adhered to provisions of the Native American Graves Protection and Repatriation Act (NAGPRA) dealing with intentional excavation and unintentional discovery of human remains. No human remains, funerary objects, sacred objects or objects of cultural patrimony protected by NAGPRA were discovered in FY 2000.

Enhancement

Public outreach and other enhancement activities are perhaps our best tool in protecting heritage resources for future generations. We monitor enhancement activities to determine whether significant sites are managed to take advantage of their recreational and educational potential, while protecting the values that make them significant. Enhancement includes products like the *Passages* brochure and *The Bear Stands Up* video and programs such as those presented at the Southeast Alaska Discovery Center (Ketchikan), the Forest Service Information Center (Juneau) and on the Alaska Marine Highway.

The Tongass National Forest has a strong public outreach program that advocates forest visitors take an active stewardship role. Passport In Time (PIT), a popular national program, offers the public opportunities to work with archaeologists on a variety of projects. Volunteers participated in several Tongass PIT projects during 2000, including several heritage resource site monitoring projects.

Archaeologists from the Forest Supervisor's Office in Petersburg and volunteers from as far away as England investigated an ancient Tlingit village this past summer. Using shovels and trowels, the team carefully pealed back layers of earth, exposing layers of discarded clamshells, fish bone, mammal bone, a few tools plus lots of charcoal. The tools include a bird bone awl, a bone fishhook, a shell bead and a stone scraper. From the charcoal we obtained radiocarbon dates suggesting people first came to the site around 850 years ago and lived there until at least 530 years ago. According to Tlingit legend, Native people occupied a village in the area after arriving from the interior by way of the Stikine River. Information gathered with volunteer help will help us to better manage this ancient site.

PIT volunteers working in Ketchikan and on Prince of Wales Island continued a project begun in Sitka in 1998 to index 1929 aerial photographs taken by the U.S. Navy. The photos, now indexed and with usable

flight line maps, will be an important addition to the Tongass National Forest's Heritage and Planning programs, facilitating comparisons between the condition and uses of the forest at the beginning and the end of the 20th century. For the Heritage Program this set of photos depicts historic mines 10 years after the peak of mining activities, canneries during their heyday, and traditional Native villages shortly after abandonment; it also shows the broad patterns of land use early in the 20th century. Future analysis of the photo set will enhance our abilities to understand the past uses of the forest and to see the forest as it was almost 80 years ago.

Pictograph Cave, located on one of Alexander Archipelago's outermost islands, contains spectacular traditional Tlingit rock art paintings, or pictographs. A 2000 PIT project brought together archaeologists, tribal representatives, Native cultural specialists and resource managers to record the paintings and to explore their meanings. The group examined oral histories and ethnographic accounts to determine the site's significance in an historical sense and to people today. In cooperation with a parallel project focused on local Tlingit history, the rock art recording and many of the interviews were videotaped with the intent of producing an interactive DVD CD ROM video. The team produced a comprehensive base map of the site and thoroughly recorded all of the recognizable pictographs in the cave. Participant's interpretations and impressions about the designs were recorded on videotape. Perhaps the most productive aspect of the week's work was the development of relationships and interactions between the crewmembers. There were many opportunities for people to share their views on the work we were doing and on their feelings about the site and the art.

The heritage program sponsored two PIT projects on the Ketchikan-Misty Ranger District to monitor the condition of heritage resource sites and conduct coastal site inventories. A total of 17 volunteers donated over 930 hours of labor to monitor the condition of a dozen sites and to document eight new sites. The volunteers learned a great deal about Tlingit culture and traditional subsistence lifestyles and about the area's historic resources. They learned much about Forest Service heritage resource management, Southeast Alaska and about each other. As one volunteer stated, "The combination of people, and the size and diversity of the group, created an atmosphere of respect for the Indian culture as well as a special learning experience that could not have been duplicated any other way."

Evidence suggests that interpretative and educational programs are effective in strengthening the public's commitment to heritage resource preservation and protection. Tongass archaeologists made numerous classroom presentations throughout the school year, and completed outreach projects in cooperation with the University of Alaska-Southeast and other academic institutions. Public outreach leads to stewardship when the Forest visitor takes an active role in protecting sites. People protect what they understand and value. We reach thousands of people each year with the message that heritage resources are fragile, non-renewable resources and if protected can yield important information about past cultures and environments.

For the fourth consecutive year, Dr. James Dixon (Univ. of CO at Boulder) and his crew have conducted archaeological research at a very important site on the Thorne Bay Ranger District. This site, in addition to a rich assemblage of faunal remains spanning the last Ice Age (more than 40,000 years BP), also contains evidence of human occupation and use from 10,000 years ago until approximately 5,000 years ago. This site, 49-PET-408 (or On Your Knees Cave) is arguably the oldest known locale of human occupation on the Northwest Coast and contains the oldest human skeletal remains from Alaska or Canada. Investigations at the site, its place in the evolving theories of "peopling of the Americas," and the role that tribes and Native people have played in the project have drawn favorable attention from Native and scientific observers. The December 2000 issue of National Geographic Magazine features stories about "Peopling of the Americas" including discussion of 49-PET-408. Tribal involvement in the project is presented as a "model for 21st century archaeology" by David Hurst Thomas (of the American Museum of Natural History) in his recent book *Skull Wars: Kennewick Man, Archaeology, and the Battle for Native American Identity.*

Evaluation of Results

The USDA Forest Service - Alaska Region has developed heritage resource management procedures to efficiently and economically carry out its obligations under Sections 106 and 110 of the National Historic Preservation Act. These procedures are outlined in a programmatic agreement that is currently being

revised. Archaeological inventory is prioritized by the likelihood of locating heritage resource sites. This likelihood is based upon an area's physical, biological and cultural features and known history. The Tongass National Forest recognizes two archeological sensitivity zones, high and low. Archeological inventory for proposed activities is concentrated primarily in the high sensitivity zones. However, some inventory is also conducted within areas of low sensitivity. The sensitivity zones are subject to refinement as new information becomes available and the zones are flexibly applied in the field. Post-project monitoring on roads and within other activity areas is accomplished to verify the assumptions of the sensitivity model and to determine whether heritage resources are present but not revealed by standard inventory techniques.

The Forest Service should continue heritage resource monitoring to ensure that Forest Plan standards and guidelines are continually met. In the past three years we have made significant progress in implementing standard monitoring procedures and increasing the number and frequency of monitoring inspections. However, we have only inspected a few of the total number of heritage resource sites on the Forest. Although the total number of damaged sites that have been stabilized are few, we are making efforts to repair damage. Funding and personnel limit additional stabilization, and/or data recovery efforts. The monitoring questions are relevant and elicit information that is essential for monitoring Forest Plan objectives.

Heritage Resources Question 2: Are Heritage Resources standards and guidelines effective in protecting heritage/cultural resources as expected in the Forest Plan?

The Forest Plan standards and guidelines are effective in meeting resource objectives, i.e. site protection and preservation.

<u>Monitoring Results</u>

Project Implementation

Current evidence suggests that Forest Plan standards and guidelines are effective in protecting heritage resources. The Tongass National Forest has a strong record of compliance with Section 106 of the National Historic Preservation Act. During fiscal year 2000, Heritage Program staff evaluated 76 undertakings for their potential to affect heritage resources eligible to the National Register. Avoidance of project impacts has been an effective mitigation approach. Tongass archaeologists monitored the condition of 138 heritage resources, many times in conjunction with project inventory.

Project Inventory/ Clearance

Overall the Tongass National Forest meets our legal compliance requirements and completes heritage resource effects analysis prior to making a NEPA project decision. We have developed an effective system to ensure that every undertaking is considered for its effects to heritage resources.

During fiscal year 2000, 138 heritage resource sites were monitored for condition assessment. Archaeologists noted accelerated erosion at eight sites, and evidence of human-caused damage at six sites. None of the monitored sites exhibited damage caused by previous Forest Service projects. The remaining 124 sites appear to be in a state of natural decomposition with no evidence of accelerated natural erosion or human damage.

This summer Petersburg Ranger District archaeologists monitored sites in Totem Bay and Little Totem Bay on south Kupreanof Island. In 1994 we had performed test excavations at three ancient shell midden sites in the area. We wanted to see how the forest had regenerated in the excavation areas. At each of the tested sites, undergrowth and forest litter have covered the test excavations and careful scrutiny is necessary to relocate the excavations. We also visited nine other sites in the area and did not find any evidence of disturbance or accelerated erosion. While we were monitoring the known sites we discovered a wood stake fish weir and additional shell midden deposits associated with a known site.

In August 2000, Petersburg Ranger District archaeologists received reports that unauthorized digging was taking place at a site near a logging camp in Rowan Bay, Kuiu Island. The site is an historic period

camp on top of a buried shell midden (49XPA021). We contacted our area's Forest Service law enforcement officer and together visited the site in September. We found approximately 20 holes dug in the site area. What, if anything, was removed from the site remains undetermined and investigations are still underway. In the meantime, we posted copies of the laws governing historic preservation in the community area and cafeteria of the nearby logging camp and informed the camp foreman of the illegal nature of the activities. There are no other communities on Kuiu Island aside from the logging camp.

The sentencing hearing for the Warm Chuck Archaeological Resources Protection Act (ARPA) case was conducted in early September 1999 in Ketchikan. The case involved a man who discovered a 1,400-year-old human skull at an eroded Indian burial site while deer hunting near Prince of Wales Island. The defendant was convicted of illegally removing the skull, making this Alaska's first ARPA conviction. He received a 3-month jail sentence, community service and was directed to pay $7,500 in restitution. In December 2000 the 9th U.S. Circuit Court of Appeals overturned the conviction, saying that the defendant did not know the human remains were older than 100 years and that he had no commercial motive in taking the items. A decision on whether to re-prosecute is pending.

One ARPA investigation near Klawock remains open. Initial reports of disturbance were received in 1999. Minimal progress has been made on the case in 2000. Frequent monitoring of the site continues.

Results of the FY 1999 Tongass National Forest Heritage Program monitoring efforts are displayed as follows:

Sites Monitored	Sites Eroding Normally	Sites with Accelerated Erosion	Sites Vandalized	Sites Damaged from Previous Forest Projects
138	124	8	6	0

The statistical results of the fiscal year 2000 monitoring program indicates that of the 138 sites monitored, about 90 percent are either undisturbed or deteriorating from natural processes (e.g. organic decomposition, soil compaction), while about 6 percent of the sites are being impacted from accelerated erosion. Archaeologists noted adverse human-caused effects (e.g. vandalism, looting) at about 4 percent of the monitored sites, while none of the monitored sites exhibit damage from previous Forest Service activities.

Mitigation

Site monitoring suggests project mitigation measures are effective in protecting heritage resources eligible to the National Register. The site monitoring is very detailed in some cases and specifically details how the site should be monitored for natural and human-caused effects.

Evaluation of Results

The Forest Plan standards and guidelines are being implemented and they do appear to be effective in meeting resource objectives, i.e. site protection and preservation. There is a need, however, to continue heritage resource monitoring to ensure that the standards and guidelines are continually met. We have in the past three years made significant progress to develop standard monitoring procedures and increase the amount of monitoring inspections. However, we have inspected only a relatively few of the Forest's heritage resources. Although the total number of damaged sites that have been stabilized are few, we are continuing to repair observed damage. Limited amounts of funding and personnel restrict additional stabilization and data recovery. The Forest Plan monitoring questions are relevant and elicit information that is essential for monitoring Forest Plan objectives.

The Tongass heritage program team has adopted the philosophy that site protection is best served through education and public outreach, fostering a fuller appreciation of the values embodied in the archaeological record and thus recruiting the public as active stewards of heritage resources. Delineating this philosophy, the Forest's archeologists are increasingly working with public school students, contributing to the development of college curricula (through the University of Alaska Southeast and other institutions), and sharing new discoveries at community functions and at public facilities. Through programs such as Alaska Archaeology Month and Passport in Time, archeologists have connected with

thousands of Alaskans who now have a better appreciation of the value of heritage resources and our approach to their management.

The public has enthusiastically embraced these outreach and education efforts, which have resulted in notable successes in public stewardship. The community of Coffman Cove, for example, is actively seeking funds to protect and interpret an archaeological site within the city. Point Baker and Port Protection residents have supported Forest-sponsored archeological investigations at one of the most ancient sites in coastal Alaska, hosting presentations and potlucks in their communities.

These significant successes create a growing demand. With information comes interest; with interest comes a desire to be involved as well as a demand for more information. We have planted the seeds of stewardship, and promised to share information through the classroom and through volunteer programs. We need to keep our promises to make the program work as well as to keep the support of the teachers and students and volunteers we have enlisted. We need to be able to go to the classrooms, when called upon. We need to continue to offer avenues through which local and non-local volunteers can participate in heritage resource management. We need to continue to reach new generations of students with the values of learning from and about the past.

All signs point toward a closer relationship between Native Americans and archaeologists in the management of heritage resources and the conduct of archaeological research. New regulations implementing the National Historic Preservation Act require much closer and sustained consultation at all levels of project planning. The ongoing process of repatriation and consultation under the Native American Graves Protection and Repatriation Act bring federal agencies and tribes into close contact. At the same time, in Southeast Alaska, Sealaska Corporation is attempting to begin an active management program for it 85 historic and cemetery sites acquired through the historic and cemetery sites provisions of the Alaska Native Claims Settlement Act (ANCSA 14(h)(1)). Sealaska seeks to work with clans and tribes to develop plans to manage these sites and to influence the management of historic and archaeological sites on other lands (federal, state, private).

A significant step forward in management of cultural resources in Southeast Alaska would be to develop agreements for cooperative management of historic and archaeological sites in the region. Working together, clans, tribes, corporations, and federal and state agencies could more effectively learn from and protect these important cultural places.

Table 2.12 – Tongass National Forest Heritage Resource Sites Monitored in FY 2000

USGS QUADRANGLE	SITE NUMBER	SITE NAME
BRADFIELD CANAL	49 XBC 031	Riverside Mine
CRAIG	49 CRG 022	Chasina Island Village
	49 CRG 041	Tuxekan Village
	49 CRG 063	Fish Egg Village
	49 CRG 072	Six Canoe Runs
	49 CRG 096	Warm Chuck Village
	49 CRG 097	Clam Island Camp
	49 CRG 113	Kasaan Island Village
	49 CRG 116	Klakas Inlet Village
	49 CRG 119	Old Klawock Village
	49 CRG 136	Tuxekan Island Village & Skook Burial
	49 CRG 143	Chief Tonowek's Grave
	49 CRG 231	Pictograph Cave
	49 CRG 279	Staney Creek Stone Fish Trap
	49 CRG 280	Staney Creek Stake Weir
	49 CRG 291	Ladrones Cabin
	49 CRG 390	Elghi Island Totems
	49 CRG 397	North Tuxekan Island Midden Site #1
	49 CRG 398	North Tuxekan Island Midden Site #2
	49 CRG 433	Thorne River Basket
	49 CRG 459	Ballpark Island Village
	49 CRG 460	Pt. Amargura Camp
	49 CRG 465	Ladrones Burial
	49 CRG 483	Sarkar Entrance Village
	49 CRG 489	Chusini Cove Stake Weir Complex
DIXON ENTRANCE	49 DIX 003	Klinkwan Village
	49 DIX 007	Hemlock Island Burial/Cemetery
	49 DIX 026	Nichols Creek Weir
	49 DIX 028	Okada Midden
	49 DIX 035	Hunter Bay Cannery
	49 DIX 037	Klinkwan Burial Island
	49 DIX 041	Nichols Entrance Village
	49 DIX 049	Bisquit Lagoon Burial
	49 DIX 050	Hunter Bay Weir
JUNEAU	49 JUN 025	Auk Village
KETCHIKAN	49 KET 010	Cat Island Village
	49 KET 013	Village Island Village
	49 KET 014	Duke Island Midden
	49 KET 015	Dog Island Midden
	49 KET 017	George Inlet Petroglyphs
	49 KET 027	Port Gravina
	49 KET 028	Sea Level Mine
	49 KET 030	Bounday Survey Storehouse #4
	49 KET 039	Roe Point Cannery
	49 KET 044	Customs House
	49 KET 047	Bostwick Inlet Village
	49 KET 052	Hut Point Village
	49 KET 056	Sockeye Creek Village
	49 KET 072	CCC Camp Yard
	49 KET 094	Lake McDonald Pictographs
	49 KET 191	Fish Creek Roadhouse
	49 KET 277	Gold Standard Mine
	49 KET 349	Gockachin Creek Traps/Midden
	49 KET 357	Mink Bay Traps
	49 KET 358	Mink Bay Midden
	49 KET 360	Weasel Cove Trap

USGS QUADRANGLE	SITE NUMBER	SITE NAME
KETCHIKAN	49 KET 361	Bailey Bay Bonanza Site
	49 KET 362	Devil Cliff Pictographs
	49 KET 409	Lake Shelokum Site
	49 KET 442	Goo Goo Mine
	49 KET 473	Mahoney Zinc Mine
	49 KET 497	Mahoney Historic Structure
	49 KET 498	Mahoney Creek Rock Alignment #1
	49 KET 499	Mahoney Creek Rock Alignment #2
	49 KET 500	Mahoney Creek Midden
	49 KET 501	Mahoney Creek Rock Alignment #3
	49 KET 524	Lake McDonald Midden
	49 KET 561	Bostwick Point Rock Shelter
	49 KET 562	Bostwick Weir #1
	49 KET 563	Bostwick Weir #2
	49 KET 564	Bostwick Weir #3
	49 KET 565	Bostwick Stakeweir #1
	49 KET 566	Mary's Camp/C.R. Nelson Homestead
	49 KET 585	South Bostwick Midden
	49 KET 586	Seal Cove Midden #1
	49 KET 587	Seal Cove Midden #2
	49 KET 589	Seal Cove Midden #3
	49 KET 590	Seal Cove Tent Platforms
	49 KET 591	Seal Cove Assay Lab
	49 KET 592	Seal Cove Mine
	49 KET 593	Seal Cove Fossil Beach
MOUNT FAIRWEATHER	49 XMF 043	George Island Gun
	49 XMF 054	Hoktaheen Creek Village
PETERSBURG	49 PET 029	Sandy Beach Fish Traps
	49 PET 067	Coffman Cove Site
	49 PET 072	Whale Pass Traps
	49 PET 086	12-Mile Cabin
	49 PET 107	Whale Pass Glyphs
	49 PET 126	Red Creek Midden
	49 PET 187	Red Bay Weir
	49 PET 189	El Cap Cave (arch)
	49 PET 190	El Cap Cave (paleo)
	49 PET 206	Snooze Creek Weirs
	49 PET 366	Mable Site
	49 PET 370	Crescent Midden
	49 PET 371	West Shore Midden
	49 PET 372	Little Totem Village
	49 PET 374	Two Maiden Midden
	49 PET 380	Rocky Bight Midden
	49 PET 381	Long Line Midden
	49 PET 382	Hawk Midden
	49 PET 401	Gumboot Midden
	49 PET 402	Lost Cabin
	49 PET 403	Found Cabin
	49 PET 405	Stone Adze Midden
	49 PET 406	Nearend Midden
	49 PET 408	On Your Knees Cave
	49 PET 409	Sal's Site
	49 PET 454	Blind Slough Cabin
	49 PET 456	Sumner Creek Fish Trap

USGS QUADRANGLE	SITE NUMBER	SITE NAME
PORT ALEXANDER	49 XPA 001	Port Herbert
	49 XPA 002	Big Port Walter
	49 XPA 014	New Port Walter
	49 XPA 015	Deep Cove Reduction Plant
	49 XPA 021	Rowan Bay East Garden
	49 XPA 049	Ozerskoi Redoubt
	49 XPA 074	Port Armstrong Whaling Station
	49 XPA 077	Red Bluff Bay Cannery
	49 XPA 296	Little Port Walter Saltery
	49 XPA 316	Red Bluff Bay Gravestone
SITKA	49 SIT 018	Cobol Town
	49 SIT 024	Todd Cannery
	49 SIT 047	Sitkoh Bay Village & Petroglyphs
	49 SIT 081	Tyee
	49 SIT 111	August Buschmann Cannery
	49 SIT 112	Ford Arm Village
	49 SIT 113	Ford Arm 2
	49 SIT 114	Ford Arm 3
	49 SIT 116	Cobol Mine
	49 SIT 139	Pack Creek Gardens
	49 SIT 229	Starrigavan
	49 SIT 269	Swan Island Midden
	49 SIT 270	Windfall Island Midden
	49 SIT 510	West Lindenberg Head Midden
	49 SIT 551	Gambier Bay Petroglyph
SKAGWAY	49 SKG 140	Kasadaya Creek Cabin
SUMDUM	49 SUM 083	Prince Island Fox Farm
	49 SUM 084	Gain Island Fox Farm

Karst and Caves

Goal: Maintain and protect significant karst and cave ecosystems Forest-wide.

Objectives: Allow for the continuation of natural karst processes. Maintain the productivity of the karst landscape while providing for other land uses where appropriate.

Background: The Tongass National Forest contains the largest concentration of dissolution caves known in the State of Alaska. The Forest also contains world-class surface or epikarst features particularly in the alpine and sub-alpine zones. The caves and epikarst features result from chemical weathering of limestone and marble bedrock. The karst and cave features and associated resources are a recently discovered and recognized attribute of the lands within southeastern Alaska and have been found to be of national and international significance for a wide variety of reasons, including their intensity and diversity of development, the biological, mineralogical, cultural, and paleontological components, and recreational values.

The Federal Cave Resources Protection Act (FCRPA) is the primary U.S. law affecting caves. It requires protection of significant caves on Federal lands. A cave must possess one or more of the criteria outlined in 36 CFR Part 290.3 to be determined "significant." Though "non-significant" caves may exist, most meet the criteria for "significant." The intent of this act is to protect cave resources, not karst resources. However, it is important to recognize that caves and associated features and resources are an integral part of the karst landscape. Karst must be managed as an ecological unit to ensure protection of the cave resources.

Current projects with Records of Decision (RODs) signed after the TLMP Revision focus on karst area protection. New Forest-wide standards and guidelines require that areas of high vulnerability karst within the project area be deleted from land considered for harvest. Karst lands included in project areas are typically low or moderately low vulnerability karst. The new standards and guidelines will be implemented in upcoming projects such as Luck Lake, Staney, Tuxekan, Kosciusko, Otter Lake, Suemez, Gravina, and Licking Creek timber sale projects. Interim guidelines for karst and caves were implemented on the Heceta Sawfly Project, since the Record of Decision for this project was signed before the revised TLMP Record of Decision was signed. Heceta Sawfly had a NEPA decision that was in category 1, Approved NEPA and Implemented Sale.

Karst and Cave Question 1: Are Karst and Cave standards and guidelines being implemented?

Monitoring was completed on projects falling under interim standards and guidelines for karst and caves, as well as projects implemented under the direction of the standards and guidelines in the revised Forest Plan. Work completed under the revised Forest Plan Karst and Cave standards and guidelines included preliminary inventory, timber unit and road reconnaissance, timber unit layout, and road layout. The standards and guidelines were implemented to the fullest extent practicable.

Monitoring Results

The Karst and Cave standards and guidelines outlined in TLMP were implemented to the fullest extent practicable.

Project under the interim Karst and Cave standards and guidelines

Heceta Sawfly Salvage Sale: In 1998, a re-evaluation of the application of the Karst and Cave standards and guidelines on the project resulted in a modification to the acreage of this timber sale after it was sold. Of the 511.7 acres of timber harvest planned, the evaluation identified 52.55 acres (10 percent) of the existing harvest units that should be deleted to fully meet the requirements of the interim standards and guidelines. Harvest of the sale has been completed. All units have been yarded and the harvested timber transported to the LTF for barging. Monitoring focused on the implementation and effectiveness of yarding prescriptions, stabilization of cutslopes associated with roads, and windfirmness of harvest unit edges and the small buffers surrounding karst features. Special focus was given to effectiveness of yarding techniques used in the harvest of the partial cut prescriptions.

Projects under the revised Forest Plan Karst and Cave standards and guidelines

DEIS or FEIS input into Cholmondeley, Moria, Luck Lake, Staney, Otter Lake, Licking Creek, Gravina Island, Suemez Island, Tuxekan Island and Kosciusko Island Project Planning: Efforts were made to insure that the karst and cave standards and guidelines were implemented in the planning of these projects, and that they will be implemented on the ground. Implementation was completed through resource specialists' actions in the planning process, following discussions with contractors and review of their findings, design and analysis of dye trace programs, on-the-ground inventory, resource report writing, writing or review of resource sections of the DEIS or FEIS for the projects, and answering public comments. On the Tuxekan and Kosciusko Island Projects, LIDAR (Light Distancing And Ranging), high resolution Digital Elevation Models (DEM) and high-resolution orthorectified photographs were generated for the subject area. This technology generated a 10-foot contour DEM. This DEM was manipulated by software (e.g. Terra Model) that generated and highlighted depression contours. This process indicated the position of sinkholes, closed basins, insurgences, and resurgences (springs) both through the forest canopy and in the second growth areas. The presence of these features was verified by air photograph interpretation and field reconnaissance.

Evaluation of Results

Project under the interim Karst and Cave standards and guidelines

Heceta Sawfly Salvage Sale: The Heceta Sawfly Salvage Sale units have been harvested. Additional protection has been placed around several features not discovered during the original unit layout or the re-evaluation. This salvage harvest focused on feature protection. This island is characterized by catastrophic windthrow events. The implementation of the karst standards and guidelines is dependent upon the effectiveness of the harvest and road construction.

The effectiveness of the yarding prescriptions was monitored in Units 14 and 19 as described below:

Harvest Unit 14: As laid out, harvest unit 14 was approximately 50 acres in size. Two additional karst features were identified during harvest and removed from the harvest unit. The unit was laid out as a partial cut with individual tree mark. Partial suspension was required. We inspected the yarding corridors and the remaining timber within the unit. Some of the yarding corridors had been brushed in and hand seeded. The contractor had not completed the brushing and seeding of all corridors. Standing timber adjacent to the yarding corridors had received damage to the bole of the trees due to contact with the yarding cable and/or impact damage from the logs being yarded. (It is estimated that 60 percent of the residual timber adjacent to the corridors in the easternmost settings have heavy scarring some 20-30 feet up the bole). Disturbance within the corridor from yarding increased as the length of the corridors increased to the eastern side of the harvest unit and the size and volume of the wood yarded up the corridor also increased. Partial suspension was most likely met with shorter yarding distances and with the yarding of smaller logs. Partial suspension was not met in the longest yarding corridors and where large logs were yarded. It appears that partial suspension was met throughout the remainder of the Unit. Karst management objectives will be met if the remaining timber within the harvest unit remains wind firm.

Photo: Unit 14. Landing 4 yarding corridors on the end of the road. The left yarding corridor was brushed back in placing slash on top of the skid trail. The right corridor shows an untreated yarding corridor without the slash replaced on the skid trail. The yarding distance in this photo is approximately 600-800 feet.

Harvest Unit 19: As laid out, harvest unit 19 was approximately 30 acres in size. The unit was laid out as a partial cut with individual tree mark. Prior to harvest, the sale administrator and the Forest geologist located the temporary roads within the unit and re-flagged the buffers surrounding several karst features. Partial suspension was required. We inspected the yarding corridors and the remaining timber within the unit. The contractor had not completed the brushing and seeding of all corridors. Standing timber adjacent to the yarding corridors had received damage to the bole of the trees due to contact with the yarding cable and/or impact damage from the logs being yarded. (It is estimated that 70 percent of the residual timber adjacent to the corridors in the northern settings have heavy scarring some 20-30 feet up the bole). Disturbance within the corridor from yarding increased as the length of the corridors increased to the northern end of the harvest unit and the size and volume of the wood yarded up the corridor also increased. Partial suspension was most likely met with shorter yarding distances and with the yarding of smaller logs. Partial suspension was not met in the longest yarding corridors and where large logs were yarded. It appears that partial suspension was met throughout the remainder of the Unit. One yarding corridor was located within a buffer intended to protect a large karst feature. Though disturbance occurred within and adjacent to the sink feature, no disturbance occurred beyond the slope break of the feature. Other than the location of the yarding corridor adjacent to this sink feature, karst management objectives will be met if the remaining timber within the harvest unit remains wind firm.

At the close of the operating season, most buffers remained intact. The buffers surrounding features isolated in the interior of harvest Unit 4 have mostly blown down as well as timber on the northern edge of Unit 4. Future monitoring efforts will be focused on the success of the prescriptions in all units and the windfirmness of the remaining forest and associated buffers. The Heceta Sawfly Project Area was flown to capture digital images. The flight covered most of the project area; additional flights are scheduled to complete the data set. This imagery will be used to monitor the success of the partial harvest prescriptions and the effectiveness of the karst feature buffers.

Projects under the Revised Forest Plan Karst and Cave standards and guidelines

DEIS's and FEIS's: Karst areas are included in the proposed harvest areas of the Cholmondeley, Moria, Luck Lake, Staney, Tuxekan, Kosciusko, Otter Lake, Suemez, Gravina, and Licking Creek Timber Sale projects. These areas were inventoried or are in the process of being inventoried, and the proposed unit pool modified to protect the karst and cave resources. An effort was made to protect the function and integrity of the karst systems, rather than individual features. LIDAR generated DEM's planned for these projects will aid in these inventory efforts.

The inventory showed that implementation of the karst and cave standards and guidelines outlined in the Forest Plan was better than in the past. It is essential to continue to train key personnel in the implementation of these protective measures. It is also essential that the Forest identify primary contacts for responsible specialists where karst resources are of concern. The use of LIDAR in the future on such projects will help to identify karst features within and adjacent to the project boundaries.

In sensitive areas, resource inventories need to be conducted by a karst management specialist, ideally working in conjunction with soil scientists and hydrologists. Karst assessment requires specialized, professional skill and judgment.

A Draft Tongass National Forest Land and Resource Plan Implementation Policy Clarification for Karst Management Standards and Guides is near completion. This draft document has been sent out for comment and peer review. This document should function as the implementation guide discussed in last year's monitoring report.

On the Tuxekan and Kosciusko Island projects, LIDAR (Light Distancing And Ranging), high-resolution Digital Elevation Models (DEM) and high-resolution orthorectified photographs were generated for the subject area. This technology generated a 10-foot contour DEM. This DEM was manipulated by software (e.g. Terra Model) that generated and highlighted depression contours. This process indicated the position of sinkholes, closed basins, insurgences, and resurgences (springs) both through the forest canopy and in the second growth areas. The presence of these features was verified by air photograph interpretation and field reconnaissance.

On the Licking Creek Project the geology of the project area and the surrounding areas adjacent to the Shoal Cove road system were mapped. This data combined with air photograph interpretation will be digitized into the GIS database and combined with the LIDAR data to be acquired next spring. This should give us a much more accurate picture of the geology and karst development of that planning area.

An attempt was made to increase communication with our partners, the Glacier Grotto, Tongass Cave Project, and the caving volunteers. The Thorne Bay Ranger District provided the Tongass Cave Project with preliminary survey results of the Kosciusko Island Project. The Ketchicave Expedition on Kosciusko Island was not held this summer due to budget shortfalls and the timing of the release of the final budget. Therefore there is a backlog of caves to be explored in the project area.

It is imperative that vulnerability classification of karst lands be conducted before timber harvest is planned. The most sensitive areas or those of high vulnerability should be identified and removed from the suitable lands base before harvest units are proposed. At least two years are needed prior to project planning to delete the gross, karst hydrology of an area through dye tracing. The Kosciusko and Tuxekan Island efforts are an example of well-planned timing.

Karst and Caves Question 2: Are karst and cave standards and guidelines effective in protecting the integrity of significant caves and the karst resource?

Monitoring included only one project that followed interim standards and guidelines for karst and caves, since projects following the karst and cave standards and guidelines in the revised Forest Plan have not been implemented on the ground to date. The monitoring indicates that the interim standards and guidelines for system protection are effective. It is not possible to determine if the standards and guides for Karst and Caves in the revised Forest Plan are effective until additional monitoring is completed.

Only the Heceta Sawfly Salvage Sale Project was monitored. Heceta Sawfly was a timber sale that implemented interim standards and guides prior to the implementation of the Revised Forest Plan.

Monitoring Results

The 2000 effectiveness monitoring focused on one area as described below:

Heceta Sawfly Salvage Sale: The Heceta Sawfly Salvage Sale units have been harvested. Additional protection has been placed around several features not discovered during the original unit layout or the re-evaluation. This salvage harvest focused on feature protection. This island is characterized by catastrophic wind throw events. The effectiveness of the karst standards and guidelines is dependent upon the success of the harvest prescriptions and design and mitigation measures for road construction.

Approximately 500 acres of harvest atop karst were monitored after timber harvest and road construction was completed in FY 2000. The majority of this harvest was associated with the Heceta Sawfly Salvage Sale. The effectiveness of yarding restrictions and buffer design were monitored. The majority of the remaining timber in the stands monitored remained intact at the close of the FY 2000 season's harvest activities. The buffers surrounding features isolated in the interior of harvest Unit 4 have mostly blown down as well as timber on the northern edge of Unit 4. Future monitoring efforts will be focused on the success of the prescriptions in all units and the windfirmness of the remaining forest and associated buffers.

Evaluation of Results

The karst and cave management standards and guidelines, where fully applied and focused on system protection, were shown to be effective in protecting the integrity of significant caves and karst resources.

Monitoring of karst and cave systems adjacent to timber harvest units and roads indicate that past harvest activities and road construction implemented prior to the new standards and guidelines, may have contributed to changes in the karst hydrology of the systems, and introduced sediment and debris into some cave systems. Implementation of new standards and guidelines will insure that future management activities will minimize these effects.

While the revised Forest Plan standards for karst and cave resources were implemented in the Heceta Sawfly Project Area, they focused on feature protection and not system protection. Even though only the minimum standards required were implemented, the project offers a good opportunity to monitor the effectiveness of applied prescriptions and mitigation. As previously mentioned, harvest of the sale is completed. Monitoring efforts will focus on the success of the prescriptions in those units and the windfirmness of the remaining forest and associated buffers.

Pre-harvest monitoring of caves is significant to determine baseline data on sediment, flow, and windthrow. No pre-harvest monitoring of caves associated with the Kosciusko Island planning effort was conducted due to budget constraints. Inventory and monitoring of the backlog of caves discovered during the past two field seasons is planned for the 2001 field season.

Land Management Planning

Background: The Forest Service policy and direction for improvement of government-to-government relationships, and collaborative, community-based resource stewardship establishes a goal of compatibility of Forest Service management activities with the goals and objectives of adjacent lands. In addition, 36 CFR [219.7(f)] requires that a program of monitoring and evaluation shall be conducted that includes the effects of National Forest management on lands, resources, and communities adjacent to or near the National Forest project or activity being planned. Effects upon National Forest land from activities on nearby lands managed by other Federal or other government agencies or under the jurisdiction of local governments will also be monitored and evaluated.

Land Management Planning Question: Is the management of National Forest System lands consistent with management objectives of adjacent lands and their management plans?

<u>Monitoring Results</u>

National Forest management projects with decisions completed in fiscal year 2000 have been evaluated to determine if any non-National Forest lands are adjacent to the project locations. Projects that have been appealed and decisions remanded during the 2000 fiscal year were not evaluated.

The projects identified as having adjacent non-National Forest System lands are listed below, along with details on the type of project, management objective, and consistency determination between the management objectives on the National Forest land and adjacent lands. Lands identified as being adjacent are within a distance that could possibly be influenced by the project.

Juneau Ranger District

<u>Glacier Gardens Motorized Trail</u>

This project is located near Juneau, Alaska. The project's Decision Notice documented the decision to authorize construction of the Glacier Gardens Motorized Trail and related facilities in the vicinity of Heinztleman Ridge. The project will involve construction of approximately three miles of accessible trail and a network of paths and gazebos to allow viewing of key vantage points in the Juneau area. The project is located within an area identified in the Forest Plan as having a land use designation (LUD) of Semi-primitive Recreation. Direction for management of this area is to provide predominantly natural or natural-appearing settings for semi-primitive types of recreation and tourism and for occasional enclaves of concentrated recreation and tourism facilities.

Non-National Forest Lands: This project is adjacent to private and city lands. This project is fully consistent with the management of adjacent non-National Forest lands.

Ketchikan-Misty Ranger District

<u>Ketchikan Lakes Hydroelectric Project</u>

The Ketchikan Lakes Hydroelectric Project is an existing combined-purpose facility operated by the City of Ketchikan, Alaska under the name of Ketchikan Public Utilities (KPU). The project uses the runoff to and storage in Ketchikan Lakes, together with run-of-river flow diverted from Granite Basin Creek, to generate electricity and to provide a water source for the Ketchikan municipal water system. This project is consistent with the Forest Plan and is in a LUD of Municipal Watershed. The Forest goal for this LUD is to maintain these watersheds as municipal water supply reserves in a manner that meets State of Alaska Drinking Water Regulations and Water quality Standards for water supply. Facilities such as dams, reservoirs, and pipelines are consistent with this LUD.

Non-National Forest Lands: This project is adjacent to private and city lands. This project is fully consistent with the management of adjacent non-National Forest lands.

Salty Timber Sale

The Salty Timber Sale Project Area is located on Revillagigedo Island, northeast of Ketchikan. The project area consists of Modified Landscape, Timber Production, and Old-growth LUD's, and non-National Forest lands.

Non-National Forest Lands: This project is adjacent to private and State lands. This project is fully consistent with the management of adjacent non-National Forest lands.

Petersburg Ranger District

Pre-commercial Thinning and Pruning

This project proposed to precommercially thin approximately 186 acres of trees and prune 59 acres of trees within previously harvested areas. The objective of the thinning and the pruning is to increase tree growth, which would subsequently increase timber value, and to maintain understory vegetation for wildlife needs.

Non-National Forest Lands: This project is adjacent to private and city lands. This project is fully consistent with the management of adjacent non-National Forest lands.

Thorne Bay Ranger District

Luck Lake Record of Decision

The Luck Lake Project Area is located approximately 17 air miles north of Thorne Bay, Alaska. It encompasses an area on north central Prince of Wales Island that extends south from Coffman Cove to just north of Ratz Harbor. Project area LUDs consist of Timber Production, Modified Landscape, Semi-remote Recreation, Old-growth Habitat, and Transportation and Utility System.

Non-National Forest Lands: There are State and private lands within the project area. This project is fully consistent with the management of adjacent non-National Forest lands.

Wrangell Ranger District

Mill Creek Trail Reconstruction

The Mill Creek Trail is located approximately 8 miles east of Wrangell (12 miles by boat), on the mainland. The trail starts at the mouth of Mill Creek, and terminates at the mouth of Virginia Lake. The project is located within a right-of-way through State of Alaska lands. Surrounding LUDs include Scenic Viewshed and Recreation River. Direction in both LUD's encourages providing compatible recreation opportunities. Trails are compatible with Forest Plan direction in both Scenic Viewshed and Recreation River LUDs.

Non-National Forest Lands: This project is located within a right-of-way through State of Alaska lands. This project is fully consistent with the management of adjacent non-National Forest lands.

Expansion of Virginia Lake Enrichment and Monitoring Activities

Mill Creek is located approximately 8 miles east of Wrangell (12 miles by boat) on the mainland adjacent to Eastern Passage. Virginia Lake is drained by Mill Creek and is located about one mile upstream from saltwater. Portions of the project are located within an easement on State of Alaska lands. Surrounding LUD's include Scenic Viewshed and Recreation River (proposed). Direction in both LUD's encourages providing compatible recreation opportunities. Activities that enhance subsistence and sport fishing are compatible with Forest Plan direction in both Scenic Viewshed and Recreation River LUD's.

Non-National Forest Lands: This project is located within a right-of-way through State of Alaska lands. This project is fully consistent with the management of adjacent non-National Forest lands.

Doughnut Timber Sale

The Doughnut Project Area is located on Wrangell Island, approximately 7 miles east of Wrangell, Alaska. The National Forest lands within the Doughnut Project Area are entirely allocated to the Scenic Viewshed

LUD. The management activities are not to be visually apparent to the casual observer in the near distance from visual priority travel routes and use areas. In the middle to background distance, activities are subordinate to the landscape character of the area. Timber harvest is allowed and roads are permitted.

Non-National Forest Lands: This project is adjacent to State and private lands. This project is fully consistent with the management of adjacent non-National Forest lands.

Monitoring Evaluation

There were no projects that were inconsistent with non-National Forest land during 2000. This has been the trend for the past three years.

Local and Regional Economics

Goal: Provide a diversity of opportunities for resource uses that contributes to the local and regional economies of Southeast Alaska.

Objective: Work with local communities to identify rural community assistance opportunities and provide technical assistance in their implementation. Support a wide range of natural resource employment opportunities within Southeast Alaska's communities.

Background: The Tongass National Forest comprises about 90 percent of Southeast Alaska's total land base. The 33 communities within Southeast Alaska use and depend on Forest resources for economic opportunities, quality of life, traditions and cultures, and recreation activities. Forest management decisions can have significant impacts, positive and negative, on these communities.

Local and Regional Economics Question: Are the effects on employment and income similar to those estimated in the Forest Plan?

Data Collection: Annually summarize estimates of the natural resource employment and income estimates from the Alaska Department of Labor employment and earnings data. Compare these annual estimates with those estimated in the Forest Plan.

Evaluation Criteria: Effects of Forest Plan implementation on employment and income by resource sector.

Precision and Reliability: Employment and income statistics for resource industries are difficult to collect for several reasons. Alaska Department of Labor employment and earnings statistics do not include self-employed persons. Most commercial fishers, many loggers, and tourism-related operations are not reflected in State data. The U.S. Bureau of Economic Analysis income and employment data does include self-employed persons, but it is not reported in the detail necessary to break out each resource-industry. In addition, State disclosure laws relating to income prevent the Alaska Department of Labor from releasing detailed figures, resulting in several gaps in the analysis.

Employment and earnings data is collected and reported by industry sectors. Every business operation has an assigned industry code for which data is reported to the State. In the case of the Recreation and Tourism sector, no single industry code exists, but it is made up of many different services and retail trade operations. The amount of business activity directly related to recreation and tourism activity is not easily available from the reported data. Recreation and Tourism figures for Forest Plan analysis were estimated using non-agriculture wage and salary employment data (not inclusive of self-employed), IMPLAN modeling output, and survey data. The data presented for this monitoring report are not directly comparable to the estimates in the Forest Plan, but are included for general trend analysis of the industry.

A similar situation exists with commercial fishers. Because most of them are self-employed, their earnings are not reflected in State data reports. The Forest Plan assumed any significant impacts to salmon fisheries would not be related to Forest management activities (see the 1997 TLMP FEIS, page 3-491). The employment and earnings data for seafood processing has been presented as an analysis of general trends in the commercial fisheries industry rather than a direct comparison of Forest Plan estimates.

Monitoring Results

Monitoring results are shown in the following tabular Forest Plan estimates and the Alaska Department of Labor employment and earnings data.

Analysis: Describe and explain the difference between the Forest Plan estimates and actual employment and earnings data.

Table 2.13 – Forest Plan Employment and Earnings, Annual Equival`ent [1]

	ASQ		NIC 1	
Employment Sector	**Jobs**	**Earnings ($ millions)**	**Jobs**	**Earnings ($ millions)**
Wood Products	1,010	45	891	40
Recreation/Tourism	3,698	117	3,698	117
Salmon Harvesting [2]	--	--	--	--
Mining	810	49	810	49
Southeast Alaska Total	40,660	1,278	40,350	1,268

1. Forest Plan estimates have been adjusted for changes made in the 1999 TLMP Record of Decision.
2. The Forest Plan did not measure impacts to Salmon Harvesting or Seafood Processing because much of the changes in the industry are not influenced by Forest Service activity; see 1997 TLMP FEIS pages 3-491 for details.

Table 2.14 – Southeast Alaska Employment and Earnings, Annual Equivalent (Non-agriculture Wage and Salary [NAWS] Employment and Earnings[1]), Years 1995 through 1998

	Jobs/ Earnings ($ millions)				
Employment Sector	**1995**	**1996**	**1997**	**1998**	**1999**
Wood Products	2,069 95	1,740 79	1,456 75	1,221 57	1,200
Retail and Services [2]	12,594 242	12,702 252	12,830 254	13,006 263	1,365
Seafood Processing [3]	1,587 40	1,326 36	1,444 34	1,289 33	1,150
Mining	189 12	273 18	331 22	337 23	300
Southeast Alaska Total	35,452 1,083	35,643 1,077	35,571 1,080	34,954 1,071	35,650

1. NAWS data includes all full- and part-time wage and salary employment; this does not include any self-employed persons.
2. Retail and Services includes all employment and earnings in these sectors, not just those associated with Recreation and Tourism. This category is used to present general trends of the sectors rather than direct comparisons.
3. Seafood Processing is presented to highlight general trends of the commercial fishing industry rather than direct comparisons with the Forest Plan. Salmon Harvesting data is not available because the majority of commercial fishers are self-employed and their earnings are not counted by the Alaska Department of Labor.

Wood Products: The Forest Plan employment and earnings figures include activities associated with private, State, BIA, Forest Service, and Native Corporation timber harvesting. The figures associated with the Forest Plan in Table 2.13 have been adjusted for the 1999 TLMP Record of Decision, which changed the ASQ to 187 and the NIC 1 component to 153 MMBF.

Recreation and Tourism: The recreation and tourism estimate in the Forest Plan, as explained above, was not recalculated for this analysis; instead, employment and earning figures for the Retail and Service sectors are used as a proxy of general trends. The Forest Plan estimate includes an estimate of self-employment and assumes full implementation, with all opportunities for recreation and tourism being fully developed. The employment and earnings data from the State do indicate an increasing trend in those sectors associated with tourism and recreation activities. Information more directly related to trends in the tourism industry is displayed under the Recreation and Tourism monitoring section of this report.

Commercial Fishing: Because State data do not include self-employed commercial fishing activity, seafood processing levels have been presented as a proxy for the general trends in the Fisheries industry. Trends are more reflective of global market conditions than Forest management activities.

Mining: The large difference in employment and earnings between the Forest Plan's levels and 1999 levels can be explained in terms of implementation. The estimates for the Forest Plan assume full implementation of all potential mining sites during the life of the plan. In reality, only profitable mining sites are likely to be opened. If gold prices do not increase significantly, it is unlikely that the mining industry will reach employment levels estimated in the Forest Plan.

Regional: Overall, Forest Plan estimates are higher than State data, and it appears the State total employment is declining. Forest Plan figures include an estimate of self-employed persons and assume full implementation over the life of the Plan, which accounts for some of the difference. Recent declines in the wood products industry and commercial fishing account for over 60 percent of the total employment declines in Southeast Alaska employment.

Wages: Wage estimates used in the Forest Plan were based on past wages and input/output modeling. Forest Plan wage estimates and actual wages reported by the Alaska Department of Labor (Table 2.15) are in nominal dollars. Forest Plan estimates for both wood products and mining are lower than actual wages reported by the State.

Table 2.15 – Southeast Alaska Annual Average Wages, Nominal Dollars

Forest Plan		NAWS, Alaska Department of Labor [1] Earnings in Years 1995 - 1999					
			1995	1996	1997	1998	1999
Wood Products	$44,542	Wood Products	$45,839	$45,228	$51,751 [2]	$47,04 [3]	
Recreation/Tourism	31,773	Retail [3]	17,584	18,345	18,045	18,459	
		Services [3]	20,707	21,277	21,325	21,568	
Salmon Harvesting [4]	26,418						
Seafood Processing	26,074	Seafood Processing	25,379	26,987	23,724	25,288	
Mining	60,971	Mining	62,825	67,128	65,729	69,214	
Southeast Alaska	30,914	Southeast Alaska	30,547	30,223	30,359	30,630	

1. NAWS = Non-Agriculture Wage and Salary Earnings. This data includes all full- and part-time wage and salary employment; this does not include any self-employed persons.

2. Earnings for this year appear to include a large amount of severance pay associated with mill closures.

3. The Retail and Service sectors include more than recreation and tourism related activity. These sectors are provided to highlight general trends rather than direct comparisons.

4. Salmon Harvesting is not included in the Alaska Department of Labor data because the majority of commercial fishers are self-employed and their earnings are not counted in NAWS data.

Recreation and Tourism estimates are significantly higher than wages reported by the State for the Retail and Services sectors. This difference is related to the assumption of full implementation of the Forest Plan, in which case all recreation and tourism opportunities would be used to provide employment and income in the future. The general increases in wages of the Retail and Services sector support the higher estimate, but it is unlikely that average Retail and Service wages will increase to the estimated level over the life of the plan.

Seafood Processing estimated wages are higher than 1998 State report wages, but are lower than 1996. This is likely reflective of a highly variable industry that is more influenced by global markets and ocean conditions than Forest management activities.

Overall, the estimated average annual wage is somewhat higher than the wages reported by the State, but the regional trend indicates a decline in 1996, with some recovery in 1997 and 1998. This could be due to a combination of poor commercial fish markets, decline in the wood products industry (which is associated with high pay jobs), and an increase in the Retail and Service sectors (which are associated with lower paying jobs).

Evaluation of Results

The monitoring results are inconclusive at this time. We need to continue monitoring the situation.

Minerals and Geology

Goals: Provide for environmentally sound mineral exploration, development, and reclamation in areas open to mineral entry and in areas with valid existing rights that are otherwise closed to mineral entry. Encourage prospecting, exploration, development, mining, and processing of locatable minerals in areas with the highest potential for mineral development. Insure that minerals are developed in an environmentally sensitive manner, and that other high-valued resources are considered when mineral developments occur. Seek withdrawal from mineral entry of specific locations where mineral development may not meet land use designation objectives.

Objective: Implement the Minerals and Geology Forest-wide standards and guidelines.

Background: A wide range of mineral resources and deposit types occur within the boundaries of the Tongass National Forest. Examples of some include, but are not limited to, gold, silver, molybdenum, and uranium, as well as nationally designated "strategic" and "critical" minerals such as lead, zinc, copper, tungsten, and platinum group metals. The Forest Service recognizes that minerals are fundamental to the Nation's well being and, as policy, encourages the orderly exploration and development of the mineral resources on National Forest System lands. The Secretary of Agriculture has provided regulations (36 CFR 228) to ensure surface resource protection during the exploration and development of the mineral resources.

Minerals and Geology Question: Are the effects of mining activities on surface resources consistent with Forest Plan expectations, as allowed in approved Plans of Operations?

During the 2000 fiscal year, approximately 80 percent of the active mining operations on the Tongass National Forest were inspected as required for project monitoring and compliance in Minerals Program Directives. The Forest processed and inspected 104 non-bonded non-energy operations, or 100 percent, for compliance with agency regulations. The Forest also processed 8 bonded non-energy operations, of which 7, or 89 percent, were inspected and administered to Mineral Program Directive standards. Non-bonded non-energy operations include mineral exploration activities and free-use material sales that do not cause significant disturbance of the surface resources. Bonded non-energy operations include mining plans of operations that will likely to cause significant disturbance of surface resources and common variety mineral sales in excess of 100 cubic yards. The Mineral program standard is to inspect each operation/site at least once per year.

Site visits include inspections for compliance with agency regulations, the approved plan of operations, resource protection measures addressed in the plan, and compliance with State or other Federal permits. Sites are also monitored to ensure that monitoring provisions in plans are completed. Activities inspected included exploration work sites, reclamation work, road construction and maintenance, timber removal, public safety and fire prevention, solid waste disposal and project monitoring. Operators were notified of problems and follow-up action was documented.

Monitoring Results:

Because of budgetary restrictions and weather problems a limited number of site visits were done during this year's Forest Plan monitoring efforts to verify project monitoring effectiveness. The following sites were visited: (a) the Salt Chuck mining claim on Thorne Bay Ranger District (Photo Nos. 1 and 2); (b) Bokan Mountain mine on Craig Ranger District (Photo Nos. 3 and 4), and (c) Cominco claims near Calder Bay on Thorne Bay Ranger District (Photo No. 5).

Photo No. 1 (1997)

Photo No. 2 (2000)

At the Salt Chuck Claims on Thorne Bay Ranger District an exploration trench was reclaimed and seeded in 1997. Monitoring of the revegetation of that site is ongoing. The results to date can be seen in the above two photographs.

Photo No. 3.

Adit entrance at Bokan Mountain Uranium Mine Site on southern Prince of Wales Island showing placement of warning sign.

Photo No. 4.

Adit entrance at Bokan Mountain Uranium Mine Site on southern Prince of Wales Island showing placement of warning sign.

Photo No. 5.

Cominco's Coak claims on northern Prince of Wales Island near Calder Bay have been vacated. After final reclamation inspection, the district released their $15,000 bond.

Other operations visited or processed were:

- An application for one non-bonded, non-energy operation was processed for prospecting activities on minerals claims near the Herbert Glacier on Juneau Ranger District.
- Santoy Company staked a large number of new claims near the Salt Chuck and Rush & Brown mines as a result of findings from the magnetic survey flown in the area last year. Exploration this year was limited to geophysical and geochemical sampling.
- The Puyallup placer and load claims have been vacated. Craig Ranger District worked to no avail to get the claimants to reclaim the site. The district prepared and submitted a bid package to hire a contractor to reclaim the site and then bill the claimants to recover costs. This work is ongoing.
- On Petersburg Ranger District four Plans of Operations for mineral exploration projects were approved for fiscal year 2000. All of the Plans of Operations involved exploratory drilling and surface mineral sampling. This exploration was a result of the magnetic survey flown in the area in 1998. Three of the four sites were visited. These sites include:

  Olympic Resources Group Project on Woewodski Island;
  Kennecott Exploration near Taylor Creek on Kupreanof Island;
  Paul Pieper (private individual) on Lindenberg Peninsula on Kupreanof Island;
  Grayd Resources (USA), Inc. on their claims near Castle River on Kupreanof Island.

The Juneau Ranger District and Admiralty Monument continue to implement Best Management Practices (BMPs) at the Greens Creek mine to determine the effectiveness of those BMPs in protecting the water resources. A summary of these activities follows later in this monitoring report.

Inspections of mineral activities indicate that the effects of mining activities on the surface resources are consistent with Forest Plan expectations for mineral operations, and what was envisioned or expected in the environmental analysis and approval of each Plan of Operations.

While the active locatable minerals workload on the Craig, Ketchikan, Petersburg, Thorne Bay and Wrangell Ranger Districts has remained constant during the past year, the districts have experienced an increase in the requests/demand for mineral materials (sand and gravel/shot rock). Material contracts and permits for mineral materials contain mitigation requirements and BMPs for reducing impacts to the water resources, as identified in the environmental analysis for each permit. The material sites are inspected annually for compliance and reclaimed when contracts expire or the material is exhausted.

Greens Creek Mine

Greens Creek Mine is located on Admiralty Island. Most of the facilities lie within the Admiralty Island National Monument; however some are located on Juneau Ranger District. Due to the low initial minerals budget received by JRD/ANM, a very minimal number of site inspections for monitoring and compliance were performed at Greens Creek Mine from October 1, 1999 through the end of March 2000. During this period, on-the-ground operations were administered to a level below the normal standard for this project, but within the acceptable standards specified for the minerals program (one inspection per year). When additional funding was secured in April 2000 for administering Greens Creek Mine, regular inspections began again, and the operation was administered to historical standard. Although the acceptable standard specified for the number of inspections of a minerals operation is one per year, this level of inspection is inadequate for an operation with the size and complexity of Greens Creek Mine.

Minimum adequate inspection/monitoring level is one site visit every two weeks in the winter, with weekly site visits during the most active times of the year. During certain types of construction activities it may be necessary to be present on site every day, such as the construction of the Bentonite-Earth wall. Daily inspections were required to affirm the wall was keyed into the impermeable silt layer underlying the tailings storage area. A failure to key the wall into the proper material could require millions of dollars at a later date to clean up the environmental consequences.

Photo No. 6

Greens Creek Mine, Tailings Facility

Photo No. 7

Placement of Bentonite-Earth Wall

The number of wildfires throughout the United States had a small, but insignificant effect on the JRD/ANM minerals program, although the minerals inspector spent a number of weeks on fire assignment. In FY 2000, 21 site inspections of Greens Creek Mine were performed. In past years, an average of 35 to 45 site inspections have been performed each year.

As part of its FY 2000 operation, Greens Creek submitted a plan to the Forest Service for exploration drilling within the land exchange area on the National Monument. This proposal was approved with a Categorical Exclusion from the need to prepare an EA or EIS, and the drilling was accomplished. Also in FY 2000, Greens Creek expanded its tailings placement within the existing tailings lease area as per its original tailings placement plan. The construction required by this expansion required specialized geotechnical and engineering review, and daily site inspections by the Forest Service during critical portions of the construction. No further NEPA evaluation was needed for this tailings pile expansion. In

this fiscal year, Greens Creek also began constructing an addition to its mill building to house an additional flotation cell to increase metals recovery. This addition lies within the existing mill site lease area. Construction of the mill expansion should conclude in FY 2001. All of these operations were monitored and inspected by monument/district staff to standard.

Photo No. 8

Mill Expansion

In FY 1999 a multi-agency review of Greens Creek's operation was started at Greens Creek's request. KGCMC's parent company was considering selling its Greens Creek operation. In order to sell, KGCMC needed a statement from the Alaska Department of Natural Resources affirming its operation was environmentally sound. To do a proper evaluation, DNR included all State, Federal, and local agencies with jurisdiction over Greens Creek's operation as part of a multi-agency review team. Fifteen Forest Service and OGC employees have been part of this review at differing levels of participation. This evaluation continued through FY 2000, and will extend into FY 2001. In FY 2000 Shepherd – Miller, a private contractor, was hired at the company's expense to evaluate the character of the mine's waste rock and tailings and the methods being used to store/dispose of it. Also evaluated was the company's Freshwater Monitoring Plan (FWMP). From this evaluation, changes to Greens Creek's General Plan of Operation were proposed. These changes will also be included in Greens Creek's application to the State for a permit to dispose of solid wastes. As of the end of FY 2000, KGCMC is preparing to submit proposed changes of its GPO to the Forest Service for approval, and the Alaska Department of Environmental Conservation is about to release its draft of Greens Creek's solid waste permit to the public.

<u>Evaluation of Results</u>

Fiscal Year 2000 inspections of mineral sites indicate that the effects of mining activities on surface resources are consistent with Forest Plan expectations. The necessity of the operator to obtain approval for their Plan of Operations provides the Forest Service the opportunity and authority to control the effects of the development on the Forest surfaces resources.

Recreation and Tourism

Goal: Provide a range of recreational opportunities consistent with public demand, emphasizing locally popular recreation places and those important to the tourism industry.

Objectives: Manage the Forest's recreation settings in accordance with the Recreation Opportunity Spectrum (ROS) standards and guidelines for each land use designation (LUD).

Background: Southeast Alaska, of which the Tongass National Forest makes up about 80 percent, possesses a remarkable and unique combination of features. These include inland waterways with over 11,000 miles of shoreline, mountains, fiords, glaciers, and large or unusual populations of fish and wildlife that provide a wide range of excellent outdoor recreation experiences. Many of these opportunities cannot be duplicated elsewhere in North America, or most other places around the world. Southeast Alaska imparts a feeling of vastness, wilderness, and solitude. These feelings are enhanced by the small resident population, and relative absence of development compared to most other national forests.

Recreation and Tourism Question 1: Are areas of the Forest being managed in accordance with the prescribed Recreation Opportunity Spectrum (ROS) class in Forest-wide standards and guidelines?

Overall, the districts have reported that areas on the Tongass are being managed in accordance with the prescribed ROS classes as described in the Forest-wide standards and guidelines.

Many sites selected to monitor for 2000 were primarily based on the location of existing recreation facilities and areas of the districts where high use traditionally occurred. Some remote locations were visited during the course of regular patrols of the roads and waterways. Outfitter/guide special use permit records along with written and verbal accounts of guiding activity helped determine high commercial use areas. Observations were also made during the course of completing condition surveys for trails and developed recreation facilities. Additional monitoring was accomplished during the course of other project work, such as during timber sale environmental document preparation.

Not all districts were able to report the monitoring that took place on their districts for Recreation. Some districts that reported specific areas monitored included:

<u>Hoonah Ranger District</u>: Fox Creek, Granite Cove, Pinta Cove, Point Adolphus, Mud Bay, Idaho Inlet/Trail River, Green Top Cabin, Salt Lake Bay Cabin, Bear Paw Lake Trail/Picnic Area, Pinta Cove shelter, Wukuklook Beach Trail, Suntaheen Creek Trail, Lisianski River Trail, Stag Bay Trails, Takanis Lake Trail, George Islands WWII Canon Trail, Portage Trail, Lemesurier Island Lake Trail, Kennel Creek Trail, Pavlof Marsh Trail, Suntaheen Fish Pass, Freshwater Bay, False Bay, Whitestone Harbor, Port Fredrick, Port Althorp, Inian Islands, Lisianski Inlet, and Yakobi Island.

<u>Ketchikan-Misty Ranger District:</u> Point Trollop, Bartholomew Creek, Wilson Arm, Wilson/Blossom Estuary, South side of Smeaton Bay, Lake 560, Point Nelson/Carp Island, South Beam Entrance, Weasel Cove/Badger Bay, Badger Lake, Northeast Arm Boca de Quadra, North Northeast Arm of Boca de Quadra, Keta River Estuary, Marten Arm/Red River, Marten River, Hugh Smith Lake, and Mink Bay.

<u>Wrangell Ranger District:</u> No specific data was collected for TLMP monitoring. The results reported are derived from activities that were part of other ongoing recreation programs.

The Wrangell Island hosts continued to monitor use at road-accessed recreation sites on Wrangell Island between May and August 2000. Information was collected on the number of persons, location, activities, and vehicle type for 15 developed sites and trails, and for recreational driving on forest development roads (FDR).

Forest Service hosts' monitoring of recreation use on Wrangell Island, including picnicking and camping, indicates the typical visitor experience is within the social, physical and managerial setting described in the Roaded Modified (RM) ROS class.

The Anan Wildlife Observatory Interpretive Staff continued to monitor visitors during June, July and August 2000. The information collected includes: visitor numbers, demographics, activities, length of

stay, and commercial guide use. This monitoring effort indicates the typical visitor experience is within the social, physical and managerial setting described in the Semi-primitive Motorized (SPM) ROS class.

The district recreation staff monitored use and conditions of 22 public recreation cabins and other sites throughout the Wrangell District. Information on cabin use was collected through the National Recreation Reservation System, and it indicates that most recreational use occurs during the spring, summer and fall months. Monitoring use at cabins and other developed recreation sites indicates the typical visitor experience is within the social, physical and managerial setting described in the ROS classes for the areas visited. ROS classes for most recreation cabins are Semi-primitive Motorized (SPM) or Primitive 2 (P2).

The Forest Service annually monitors the activities, and amount of use by outfitters and guides on the uplands throughout the district. Use is determined mostly through year-end use reports submitted by permitted outfitters and guides.

Monitoring of reported use by outfitters and guides on the district indicates the typical visitor experience is within the social, physical and managerial setting described in the ROS classes for the areas visited. ROS classes for these areas range from Primitive (P) to Roaded Modified (RM).

Monitoring Results

Forest wide there were fewer reservations made for the 150 public use cabins on the forest. The reductions in use did not occur at all sites, and some cabins received their traditional levels of high use which is attributed to either their locations near communities or their popular resource uses (fishing, hunting, wildlife viewing, etc). Use numbers from the cabins reservation system assist in monitoring the ROS levels for these sites as well as provide indications of trends over time of visitor use for some of the Forest's most popular recreation areas.

Use at the visitor centers varied by site. With the opening of the renovated Mendenhall Visitor Center in Juneau, the facility saw a general increase in use. The Southeast Alaska Discovery Center also noted an increase in use, which they attribute in part to the better advertisement of the Alaska Natural History Associations Bookstore located within the facility. Other visitor centers in Petersburg and at the Juneau Convention Center saw a general reduction in use, which was attributed in part to being able to make cabin reservations on the internet rather than having to make them at these locations.

The Petersburg District reports five timber sales analyzed for ROS changes. The anticipated changes from Primitive or Semi-primitive Roaded ROS settings are compatible with the LUDs where these changes will occur. Also, on Kupreanof Island and Kuiu Island, some changes to the ROS have occurred from timber harvesting and road building as anticipated through previous NEPA documents.

The Hoonah Ranger District continued their collaborative agreements with Southeast Alaska Wilderness Exploration and Discovery (SEAWEAD) to monitor three sites for land and offshore activities. Another agreement was instigated for FY 2000 for two additional sites. During this year the protocols were refined, and the information collected is being analyzed. It appears that most areas involved with this collaborative effort may exceed the social threshold for their respective ROS classes. Most of these sites will be addressed in the Shoreline Analysis Environmental Impact Statement (EIS) being prepared for most of the districts on the northern part of the Tongass to determine levels of use to be allowed for outfitter and guide use.

The Wrangell Ranger District made use of an Island Host. The host provides maintenance and monitoring information to the district from May through August.

Evaluation of Results

Districts accommodated monitoring work as a normal course of business. Several sites on the Sitka, Hoonah, and Juneau Ranger Districts, and Admiralty National Monument have identified potential conflicts with users or have use higher than can be accommodated by the ROS class. The issue of potential conflicts for these districts is being addressed this year in the Shoreline Analysis EIS. The implementation of the decision may reduce the impacts of some uses in some specific locations. Other

locations where there are perceived conflicts with the number of users at a particular location will likely continue as the agency does not have the authority to regulate use on waterways where the noise from boats may disturb upland visitor uses.

The Woodpecker campsite and the mouth of Petersburg Creek are two sites on the Petersburg Ranger District identified in last year's report as needing follow-up monitoring. Neither received monitoring in 2000 due to low funding levels and personnel shortages.

Recreation and Tourism Question 2: Is Off Road Vehicle (ORV) use causing, or will it cause considerable adverse effects on soil, water, vegetation, fish and wildlife, visitors or cultural and historic resources of the Forest?

The primary ORV use on the Tongass has been snowmobiles and four-wheelers. Snowmobiles generally make use of Forest roads and higher alpine areas during the winter months, although some use does also occur within the Stikine-LeConte Wilderness. Use of this equipment is restricted to times when there is adequate snow cover as provided by the Alaska National Interest Lands Conservation Act (ANILCA). Four-wheelers are normally used for hunting during the fall months on Forest roads.

<u>**Monitoring Results**</u>

ORV use on the Tongass in general is not causing considerable or adverse effects on soil, water, vegetation, fish and wildlife, visitors or cultural and historic resources on the Forest. Some specific locations near the Herbert River, and the Dan Moller Trail on the Juneau Ranger District have seen impacts primarily from four-wheelers using areas that are closed; use has resulted in impacts to soils and wetlands. The Craig Ranger District also reported some minor damage to wetlands occurring at the Twenty-Mile Spur and the Tracadero area on the district. The Wrangell Ranger District has also documented some minor disturbances that have been scattered throughout the district. These include several locations on Wrangell Island and Zarembo Island. The Sitka Ranger District monitored the Iris Meadows area on Kruzof Island with photo points and enforcement trips to document the recovery of areas that were impacted from ORV use and areas now closed to ORV use. Near the Starrigavan ORV Trail, the Sitka District has been monitoring barriers put in place to prevent the use of equipment in the streams.

Evaluation of Results

Some monitoring of winter recreation will take place in 2001 on some districts, with an emphasis on areas known for high use. Districts should monitor use of four-wheelers during hunting season, along with emphasizing education when the opportunity presents itself and law enforcement efforts when appropriate. The Sitka Ranger District has found that the vegetation is recovering in the Iris Meadows area. The district has also found use of ORV's in streams near the Starrigavan ORV Trail but have fewer funds available to monitor or manage this area as outlined in their management plan.

Some items identified for additional work in the 1999 annual monitoring and evaluation report were not reported by some districts primarily due to other priorities and not having funding or staffing to pursue these efforts.

Research

Goal: Continue to seek out and promote research opportunities that are consistent with identified information needs.

Objective: Cooperate with PNW in pursuing the high priority information needs identified in Appendix B [of the Forest Plan] through the intra-agency agreement entitled "Joint Studies for Improved Future Tongass National Forest Planning" and other means.

Background: Appendix B of the Forest Plan identifies priority research important for further Forest Plan amendment or revision, and lists additional data and information needs that will help to implement the Forest Plan. While not essential to the completion of the Forest Plan, results of the priority research items, prior to the completion of the next revision of the Forest Plan, will substantially strengthen the scientific information base needed to support alternative development. An important element of the priority research items and additional information needs is an "adaptive management" feedback loop to evaluate current plan direction, design monitoring programs to measure effects, and adjust future management activities to better address economic, social, and environmental concerns on the Tongass.

As a part of this process, statistically sound sampling design and analysis techniques need to be developed to assure reliability of monitored data and interpretations. This additional research component will be important for maintaining the scientific creditability of the Forest Plan.

Research Question: Have identified high-priority information needs been fulfilled?

<u>Monitoring Results</u>

The following is a summary of the progress and significant results from research studies addressing high priority information needs and other information needs. Listed for each applicable priority need is the research need stated in TLMP, Appendix B, followed by a statement that briefly describes the focus of the research.

Project 1: Alternatives to Clearcutting (ATC)

Objectives: Evaluate a wide range of silvicultural options for managing old-growth forests in Southeast Alaska in order to determine their biological, physical, and socioeconomic effects, and to clarify the operational issues related to ATC treatments.

Accomplishments: Vegetation data were collected with a system of permanent sample plots. We obtained detailed measurements on roughly 13,200 living and 3,500 dead trees in 27 stands. These measures include species, age, size, form, growth, microsite, and presence of damaging agents. Understory vascular plant cover and biomass were measured on these plots to characterize plant abundance, diversity, and deer forage availability.

To characterize the pre- and post-harvest composition and density of forest birds, we conducted censuses during the nesting season. We conducted the censuses at three stations within each experimental unit at three times between early May and mid-July.

We examined invertebrate (terrestrial and aquatic) and coarse detritus transport from forested headwaters to downstream aquatic habitats. Fifty-two small streams representing a geographic range throughout Southeast Alaska (three ATC units – Hanus Bay, Portage Bay, and Lancaster Cove, and one additional site near Juneau) were sampled with 250-μm nets per 24-h intervals either seasonally (spring-summer-fall) or biweekly throughout the year. Sampling occurred in fishless reaches, and in most cases upstream of salmonid-bearing habitats, to assess the potential energy subsidies fishless headwater streams make to downstream salmonid habitats.

An automated system of sensors and dataloggers was established to continuously record rainfall and groundwater accumulation and movement. These data will be used to determine the groundwater response to seasonal and individual-storm rainfall, both before and after treatment. Multiple years of pretreatment data were collected, allowing us to characterize baseline levels of year-to-year and seasonal variability.

Benefits to NFS: This study provides a greater number of scientifically tested options for joint production of wood and other forest values. Information on the costs and benefits of adopting alternative silvicultural systems, allowing better informed choices among management alternatives, is supplied through the study findings. Alternative systems may lead to reduced conflict and greater social acceptance of commodity production, by yielding sustainable timber harvests, protecting fish and wildlife habitat, maintaining biological diversity, maintaining slope stability, and reducing visual impacts. This study provides guidance for implementing Forest Plan direction to increase the use of alternatives to clearcutting.

Project 1a: Alternatives to Clearcutting (ATC) --Social Acceptability of Alternative Forest Management Practices

The larger interdisciplinary study aims to evaluate the ecological, economic, operational, and social aspects of an array of timber harvesting techniques as alternatives to clearcutting old-growth forest stands in Southeast Alaska. This long-term project comprises the social acceptability component of the larger study.

Objectives: FY 2000 objectives included completing exploratory field interviews concerning the social acceptability of alternatives to clearcutting, undertaking a literature review on this topic, and developing a survey approach to measure public attitudes, values, and experience related to a range of forest management practices.

Accomplishments: A literature review was completed in FY 1999 and early FY 2000. Field researchers used photographs and preliminary findings from the larger Alternatives to Clearcutting project to frame structured interviews with Southeast Alaska residents. We conducted 27 key respondent interviews with 3 respondents from each of 9 user groups in the region. A final report was completed. Results were presented at the Society and Natural Resources Symposium in Bellingham in June 2000.

The resident survey component of this project was pre-tested and ready to be administered in February 2000. This component is on hold pending OMB approval for a resident survey in Southeast Alaska.

Benefits to NFS: Much information concerning public attitudes and values related to timber management practices was gathered during the revision of the Forest Plan. This project will further our understanding of public preferences for and responses to future forest management practices. Findings from this project will assist in developing management plans that may achieve higher public acceptance.

Project 2: Effects of Silvicultural Treatments on Young-Growth Wood Quality

Objectives: The objective of this research is to quantify the relationships among silvicultural treatments (thinning and pruning), site conditions, and several measures of wood quality for young hemlock-spruce stands in Southeast Alaska.

Accomplishments: Stands were sampled that were experimentally treated 22 to 24 years ago as part of a long-term density study of even-aged stands in Southeast Alaska. An experimental design was unusually rich compared with typical wood quality studies. It included two species (western hemlock and Sitka spruce), four thinning levels (unthinned, light, medium, and heavy), four stand ages at time of thinning (spanning 15 to 45 years), and two levels of site quality (moderate and high).

The testing of the NDE system and laboratory evaluation of wood mechanical properties has been completed and a report has been published (Wang, Xiping; Ross, Robert J.; McClellan, Michael H.; Barbour, R. James; Erickson, John R.; Forsman, John W.; McGinnis, Gary D. 2000. Strength and stiffness assessment of standing trees using a nondestructive stress wave technique. Res. Pap. FPL-RP-585. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory. 9 p.). This paper focuses on the performance of the *in situ* NDE system in comparison with traditional destructive laboratory testing. A second paper will be prepared that examines the relationships between silvicultural treatments and wood mechanical properties in more detail.

X-ray densitometry studies are continuing. In June 1999, we contracted with Robert Megraw at the Weyerhaeuser Technology Center to conduct the x-ray densitometry. This work commenced in August 1999 and the scanning of the 1050 samples was completed in August 2000. Analysis of these data is

underway, and will provide information on thinning effects on wood density, growth-ring distribution, proportion of juvenile wood, and distribution of earlywood and latewood.

Development of the branch model is continuing. The data for the model were collected in 1998 from trees that were felled for destructive sampling and from standing trees within the measurement plots of the stand-density study. The model will predict branch frequency, size, and distribution as a function of species, thinning intensity and timing, and site quality. As an interim product, we plan a manuscript describing branch distribution and wood quality effects in butt logs of spruce and hemlock.

A companion study of responses to pruning is progressing well. We expect a draft manuscript on epicormic branching in spruce (Western Journal of Applied Forestry), and we also expect completion of a manuscript on pruning effects on tree growth and survival, conifer ingrowth, and understory plant diversity and abundance (Canadian Journal of Forest Research).

For the study of thinning effects, we sought to better characterize the within-stand variation in wood properties, so in 2000 we collected wood cores at breast height from 160 western hemlock and Sitka spruce trees. The cores were collected from heavily thinned and control (unthinned) plots that were treated at 14 and 41 years of age. This sample brackets the treatment intensity and age at time of treatment in the main study.

Benefits to NFS: Understanding the link between silvicultural practices and young-growth wood quality will aid silviculturists and planners in modeling and prescribing intermediate treatments to maximize benefits from developing young stands.

Project 3: Evaluation and Development of Growth-and-Yield Models for the Adaptive Management of Young-Growth Stands in Southeast Alaska

Objectives: Facilitate use of FVS-SEAPROG by improving the quality of the antecedent stand exam analysis program and its linkage to SEAPROG; assist the extension of SEAPROG with mistletoe and decay subroutines; produce a documented analysis of FVS-SEAPROG performance, its applicability to adaptive management decision-making, and recommendations for enhancements; and migrate growth data from studies of partial cutting into the model.

Accomplishments: In 2000, four major improvements were made to Superstand:

Corrected the routine for deducting defect volumes.

Revised the volume calculation routines to ensure the application of appropriate volume equations.

Revised the procedures for applying height-diameter relationships.

Revised the output format to be compatible with SEAPROG input requirements, thus eliminating the need for tedious editing by users.

Although this work was not proposed in our original plan, we felt it was necessary in order to make SEAPROG more useful.

From our recently completed study of the productivity of forested wetlands, we learned that FVS-SEAPROG growth predictions agree closely with observed growth in stands up to 45 to 50 years after clearcutting. On these poorly productive sites (representing the lower end of sites actively managed for wood production), the model showed no tendency to over- or underestimate growth.

Our analysis of performance on moderately to highly productive sites is continuing. Preliminary results from the analysis of residuals (estimates from plot measurements - FVS predictions) for basal area shows an approximately gaussian ("normal") distribution of residuals, but hypothesis tests of whether the mean of residuals is zero are soundly rejected ($P<0.001$). The mean value from observed residuals indicates SEAPROG is predicting too low in these cases. Residuals from prediction of cubic foot volume, 32-foot board-foot volume, and quadratic mean diameter all show central location to be at a positive value, which significantly differs from zero. Again, this indicates SEAPROG is predicting values that are lower than those determined from actual measurement of the plots. The Taylor plots (older, even-aged) included in

the database seem to express the same pattern as the Farr plots. These results are preliminary and we are in the process of checking several model parameters to ensure that these results are correct.

Benefits to NFS: Enhanced ability to predict the development of forest vegetation structure following natural disturbances, or after management activities for timber, habitat, restoration, or visual objectives.

Improvement of young-growth timber productivity modeling was identified as a high-priority information need during the recent Forest Plan revision.

Project 4: Goshawk Nest Tracking and Prey Abundance

Objectives: To locate and monitor bird use of known and new goshawk nest sites, and to determine and estimate the abundance of potential bird and mammal prey for northern goshawks among habitats represented in commercial timberlands.

Accomplishments: The study is providing more detailed information on goshawk movement patterns, home range size, habitat use, and survival. Several surveillance cameras have recorded thousands of hours of video footage, helping to identify use patterns and prey brought to nests by adults to feed to their young. During the field season, goshawks were banded on various nest sites and many radio-collared goshawks were monitored during the year. Results from the monitoring continue to indicate that the birds predominately use mature and old-growth forests for nesting and foraging.

Benefits to NFS: Identifying habitats that support prey species will help with understanding the need, if any, for mitigation procedures to support goshawks when developing and evaluating potential timber sales. The information will be developed into a wildlife relationship model to help managers evaluate value of different habitats to goshawks.

Project 5: Density and Demography of Endemic Small Mammals

Objectives: The purpose of the effort is to determine habitat relationships and estimate density of two endemic small mammals (Prince of Wales flying squirrel and Wrangell Island red-backed vole) among forest habitats of the Tongass National Forest. Specific objectives include documenting the following among commercial forest land habitats: 1) density of POW flying squirrels in productive old-growth and mixed-conifer habitats; 2) age and sex composition of study grid samples; 3) number of reproductive females; and 4) microhabitat features associated with capture of individuals' age and sex groups.

Accomplishments: We are completing the third year of fieldwork as proposed in the study plan. To date, we completed virtually all the field work as outlined in the study plan on schedule with the exception of obtaining solid population estimates in both habitats in both seasons in the first year.

Benefits to NFS: This project meets strong commitments in the TLMP Record of Decision (April 1999) and Forest Plan to generally increase study efforts on endemic small mammals. It also provides baseline ecological information regarding habitat distribution and abundance among four important forest habitats for two reputed old-growth habitat species that are endemic to Southeast Alaska and consequently have limited geographic ranges. This information will contribute toward a habitat model that should aid in determining habitat needs and the potential effects of timber harvesting in preferred habitat.

Project 5a: Endemism and Distribution of Terrestrial Mammals on the Tongass National Forest

Objectives: Document endemism and distributions of the terrestrial mammal fauna of Southeast Alaska.

Accomplishments: This effort is still discovering new species records for major islands; for example, water shrews on Wrangell Island, flying squirrels on Dall Island, and ermine on Heceta Island.

Benefits to NFS: Effort satisfies strong commitments in the TLMP Record of Decision (April 1999) and Forest Plan to evaluate the distribution and degree of endemism in small mammals in Southeast Alaska. When completed, the work should allow the Forest Service to model the likely impacts of timber harvesting on endemic small mammals in various locations.

Project 6: Salmon Habitat Monitoring

Objectives: To develop effectiveness monitoring protocols for aquatic habitat conditions.

Accomplishments: The emphasis of the past three years of work has been on data collection and obtaining a range of samples that includes the major geographic areas of Southeast Alaska from north to south. Single channel floodplain reaches were selected as the focus of the study to increase the probability of detecting differences (larger effect size) and to increase the statistical power of the sample size. Our focus on low-gradient, depositional channels, which respond to and retain the signature of many natural and land management-related disturbances throughout the watershed, is a cumulative effects approach. Preliminary data analysis has been completed in some aspects of the study to determine the adequacy of the sample plan, test methodologies, and to further develop hypotheses. This has allowed adjustments to some of the original objectives and to verification of sample methodologies. In 2001, data will be analyzed and draft results will be available.

Benefits to NFS: The identification and measurement of interactions between aquatic/riparian habitat and disturbances in upland areas, and the response of anadromous and resident salmonids, will provide information necessary to properly design major ground-disturbing activities in upland areas to minimize impacts on salmonid habitats.

Project 7: Community Level Economic Impacts and Dynamics

By providing empirical estimates of impact processes and a more detailed understanding of the determinants of local economic structure, this study area seeks to identify the dynamics of growth and impact in the region and its communities. This information, in turn, may be used to improve impact assessment and management decisions.

Objectives: A major objective is to provide quantified, empirically based estimates of the impacts of changing timber employment on other types of local employment. An additional objective is to identify major determinants of growth and change in local economies.

Accomplishments: Robertson completed a Ph.D. thesis that provides an empirical estimation of the community level impacts of changing timber employment in Southeast Alaska. Robertson also completed a draft (currently in review) study quantifying the major determinants of economic growth and structural change in Southeast Alaska. This latter study concentrated on the increasing role of non-manufacturing and non-wage income in the regional economy.

Benefits to NFS: The benefits to the Forest Service in Region 10 include better estimation procedures and parameters of the expected impacts of future planning decisions. These can be used in impact assessments in future planning efforts and to generally assess the impact of policy on communities and their residents. More generally, both of the studies listed above help managers to understand the implications and limitations of their decisions on the welfare of residents and forest users.

Project 8: Recreation and Tourism

Recreation and tourism present a number of challenges to management of the Tongass National Forest. In contrast to timber, recreation/tourism outputs are difficult to measure, they usually have no explicit dollar value, and their "production functions" are not easily defined. Similarly, the influence of management decisions on the quantity and quality of outputs, as well as the impacts of recreation/tourism development in general on local welfare are still not well understood. With the increasing importance of recreation/tourism in Southeast Alaska, the need to better understand this resource and its relation to management has become increasingly obvious. This study program is designed to meet this need.

Objectives: The central objective of this study program is to define and explore central questions and topic areas for future research. Initial research directions include: (1) demand for forest-based recreation/tourism; (2) role of recreation/tourism in local economic development; and (3) allocation and pricing of recreation/tourism opportunities. This problem definition should be seen as an ongoing process in which research products and "answers" will be used to identify future research questions and directions.

Accomplishments: Two studies are now in progress: 1) Macroeconomic analysis of structure and trends in recreation and tourism in Southeast Alaska. Two reports are currently in draft form and should reach publication early in calendar year 2001. 2) Using markets and economic instruments as management tools for recreation and tourism in Southeast Alaska. Preliminary work was started in FY

2000; concentrated work in this area is scheduled to begin in calendar year 2001. Other progress involves gathering information on Forest Service recreation programs from Tongass NF staff and developing familiarity with issues and tools related to user fees and other recreation pricing techniques.

Benefits to NFS: The benefits to the Forest Service in Region 10 include a better understanding of the central issues involved in recreation/tourism management of the Tongass National Forest. Work in this area also will serve to summarize for managers the experience of professionals working in recreation/ tourism in other regions and countries. Hopefully, it will identify specific policy improvements enhancing public benefits or Forest Service revenues.

Project 9: Timber Supply and Markets

This project focuses upon the economics of timber production and wood products processing in Southeast Alaska. Main topics include: (1) production costs and the Region's relative advantage in different types of wood products production; (2) the relative position of Southeast Alaskan species and log grades in foreign markets; and (3) demand projections for the Region's wood products.

Objectives: The project's objective is to develop economic and market information to better inform Forest Service policy makers. Specific examples include demand projections in relation to the TTRA and TLMP, identification of fiscal impacts of policies such as the cedar log export ban, assessment of the viability of different types of timber processing activities, and identification of the relative efficiencies of different policies to promote value-added manufacturing in the Region.

Accomplishments: In FY 2000, most of the work was devoted to wrapping up this project.

Benefits to NFS: The benefits to the Forest Service in Region 10 from this competitive advantage study include a detailed analysis of production costs in the Region and the assessment of the profitability of different products, species and log grades. This information, in turn, will be an essential element in identifying efficient and inefficient policies designed to achieve Forest Service policy goals in the area of timber management, particularly efforts to promote value-added processing in the Region. The market arbitrage study quantified the linkages between prices in Southeast Alaska and those of the PNW. This information, in turn, can be used to link Region 10 market and planning projections with broader national projections such as those found in the RPA.

Project 10: Tourism/ Recreation Studies

This long-term project initiates study of tourism and recreation topics in the Tongass National Forest. Research is planned to examine aspects of the increasing tourism and recreational use of the forest, residents' attitudes and values concerning tourism development, tourism and recreation demands on forest resources, tourism and recreation growth vectors, and the interaction of tourism and recreation with other forest uses. Initial research will focus on Southeast Alaska residents and communities. Subsequent years' research will examine visitors' experience with the Tongass National Forest and the national perspective on the use of this forest for recreation and tourism.

Objectives: Specific objectives for work in FY 2000 included description of the structure of the sector; factors affecting economic structure and patterns of activity; recent trends of the sector; and likely developments in the sector, such as levels and types of activities over the planning horizon.

Accomplishments: Most components of a literature review were completed in late FY 1999 and early FY 2000. A review of Tongass tourism trends in 1999 was completed. Further literature review was undertaken in FY 2000, with a draft problem statement being prepared for planned field research.

FY 2000 saw the preparation of survey instrument components covering tourism issues to be part of a resident survey in Southeast Alaska. This survey will be administered following completion of further Office of Management and Budget review.

A trend analysis for tourism in Southeast Alaska was also prepared. This analysis was presented at the Bellingham meeting of the Society and Natural Resources Symposium in June 2000, with final write-up expected this calendar year.

A research proposal to undertake community based tourism studies in three Southeast Alaska communities (Haines, Hoonah, and Craig/Klawock) was also prepared. The research will focus on community response to tourist activities and the changing use and definition of natural resources that results from these activities. Interviews with community members and with tourism business operators will form the basis of the field studies. Five months of fieldwork in Haines has been completed and work has begun in Hoonah. A field report based on work in Haines will be forthcoming.

Benefits to NFS: Tourism and recreation have been growing rapidly in the Tongass National Forest, with attendant greater and varying demand on forest resources, as the region changes from commodity production to a different economic base. Residents' and communities' interest in and response to these tourism and recreation increases are complex. This research will provide needed objective information on tourism and recreation not available from other sources.

Project 11: Subsistence Data Gathering and Analysis

Subsistence harvest of fish and wildlife continues to be a key activity in most of the Tongass National Forest. The Alaska National Interest Land Conservation Act (ANILCA) requires the Forest Service to evaluate the impact of its land use actions on subsistence. Additionally, the Federal Subsistence Board has management authority over subsistence hunting and fishing on the Tongass National Forest, and the Forest Service has the main responsibility to collect data needed for management decisions. This long-term project provides for systematic collection and analysis of subsistence data for Tongass National Forest communities.

Objectives: To better understand subsistence harvest and use of fish and wildlife by residents of Southeast Alaska communities, and to examine diachronic changes and trends in subsistence.

Accomplishments: Harvest assessments were completed for the remaining Prince of Wales communities in FY 2000. Field household interviews in Wrangell and Petersburg were conducted in fall, 2000. The Yakutat Native Association will be providing a harvest assessment for Yakutat in early 2001. Work in these remaining communities will complete this round of harvest assessments in the larger Southeast Alaskan communities. Similar survey work will also need to be undertaken in a number of very small communities to complete this round of data collection; these communities include Elfin Cove, Gustavus, Hyder, Meyers Chuck, Pelican, Port Alexander, and Tenakee Springs. Work in this last set of communities may be undertaken in FY 2001.

Harvest assessment data have been included in a statewide Community Profile Database maintained by the Department of Fish and Game. These data are internet accessible.

Benefits to NFS: This project provides data and analysis needed both for forest management objectives and for meeting Federal subsistence management requirements.

Project 12: Traditional Ecological Knowledge

This project explored Tlingit Indian traditional ecological knowledge of the forest and its resources, with an interest in identifying possible relationships between traditional ecological knowledge and scientific understanding of the forest and of forest processes.

Objectives: To review existing literature related to Tlingit Indian knowledge of forest resources. To conduct interviews with Tlingit elders and standard bearers on the themes identified in this literature. To outline directions for further productive research on traditional ecological knowledge topics.

Accomplishments: A review of existing data sources and limited key respondent interviewing was completed in mid FY 2000. This review identified the more important data sources and a number of TEK themes that might be explored further. Traditional land use and ownership proved to be the most promising area for further research. Contemporary Tlingit and Haida communities are generally located within historic tribal territories, and tribe, clan, and house use of land and natural resources continues to have contemporary importance.

Benefits to NFS: This project provides an approach to understanding the potential use and possible limitations of traditional ecological knowledge.

Project 13: Social Characteristics of Southeast Alaska Communities, Impact of Forest Management, Southeast Alaska Residents Attitudes and Values.

This project examines aspects of the interaction of Southeast Alaska communities with the Tongass National Forest.

Objectives: To develop a research approach to examine community-forest interactions.

Accomplishments: Most effort in this project has gone into development of the Southeast Alaska resident survey. In late FY 1999, work began with the University of Alaska, Anchorage, Institute for Social and Economic Research (ISER) to develop an appropriate survey instrument and methodology. Regional and TNF staff and a large number of agency cooperators provided comments and suggestions on survey components.

Benefits to NFS: This study will lead to a better understanding of how Southeast Alaska residents interact with the forest and encourage development of management approaches more closely aligned with local needs.

Project 14: Product Recovery and Quality from Young-Growth Western Hemlock and Sitka Spruce in Southeast Alaska

Objectives: Determine volume recovery and quality features of young-growth western hemlock and Sitka spruce logs in Southeast Alaska.

Accomplishments: Usable wood volume, lumber grades, and mechanical strength were measured for 278 young-growth trees harvested on Prince of Wales Island. Analysis has been completed and a draft publication prepared. The first draft went through internal review. It was decided to change the publication from a station paper to a journal article. A reformatted and revised draft is nearly complete and ready for external review.

Benefits to NFS: Information on the volume recovery and quality of timber products derived from young-growth stands will aid planners and silviculturists in modeling and designing management actions to maximize benefits from developing young stands.

Project 15: Growth and Yield of Second-Growth Stands Developing After Clearcutting on Wetland Soils

Objectives: Evaluate the timber productivity of young-growth stands developing after clearcutting on four organic wetland soil series: Kaikli, Karheen, Kitkun, and Maybeso.

Accomplishments: The study has been completed and a manuscript is in the review process. Results suggest that growth of young stands on these wetland soil sites closely track those predicted for planning purposes. An unanticipated result of the study was the finding that forests in the Region grow on a much broader spectrum of organic soils than previously recognized.

Benefits to NFS: Determine if young stands on these wetland soil types are capable of meeting the minimum volume requirements (20 cubic feet per acre per year at culmination of mean annual increment) for commercial timberland so that a determination can be made as to whether they should or should not be included in the suitable timber base.

Evaluation of Results

Progress on each of the Research studies is progressing as anticipated. None of the preliminary results from the studies have identified any need to change the Forest Plan at this time.

Scenery Resource

Goal: Provide Forest visitors with visually appealing scenery with emphasis on areas seen along the Alaska Marine highway, popular small boat routes and use areas, State highways, major Forest roads, major recreation facilities and from popular recreation places. Recognize that in other areas where landscapes are altered by management activities, the activity may visually dominate the characteristic landscape.

Objectives: Manage the scenery of the Forest in order to achieve the following visual quality objectives:

- Retention – 4.8 million acres plus acres of Retention in Wilderness;
- Partial Retention – 3.2 million acres;
- Modification – 0.4 million acres;
- Maximum Modification – 2.8 million acres.

Background: Each land use designation (LUD) in the Forest Plan has a corresponding visual quality objective that defines maximum levels of visual impact desirable from human-induced alterations to the natural landscape character. Associated with each objective is a set of recommended guidelines that includes unit size ranges and type of harvest treatment for different visual absorption capability settings. Also part of the FORPLAN modeling process includes a set of guidelines that define roughly how much of a viewshed (or logical part of a viewshed segment) can be in a “disturbed” condition and still meet the visual quality objective. This monitoring effort is intended to assess whether these guidelines, as applied, actually result in meeting established visual objectives.

Definitions:

Harvest treatment – clearcut, group selection, single-tree selection, diameter-limit partial cut.

Visual Absorption Capability (VAC) – the ability of a landscape to absorb human-caused alterations without changing the natural character of the landscape. There are three classifications – Low, Intermediate, and High. Low VAC landscapes are generally those with steep slopes, minimal terrain and vegetative diversity. High VAC landscapes are those with gentle slopes, and/or high terrain and vegetative diversity.

Scenery Resource Question: Are the standards and guidelines effective in attaining the adopted Visual Quality Objectives established in the Plan?

The Forest Plan monitoring and evaluation criteria for determining the effectiveness of the Scenery standards and guidelines are whether the standards and guidelines associated with the harvest unit size, type of silvicultural system used, amount of dispersal between units, and the overall percent of viewshed disturbed are generally adequate to meet the different visual quality objectives in different types of landscapes.

The Forest Plan directs that a representative set of viewsheds across the Forest that have been harvested during implementation of TLMP standards and guidelines be selected for evaluation and monitoring. The viewsheds selected should be associated with the use areas or travel routes on the Visual Priority list identified in the Forest Plan. The viewsheds should include areas representing the different characteristic landscapes and different Visual Absorption Capability settings. Monitoring should also include assessing the effectiveness of alternatives to clearcutting management. Monitoring and evaluation reporting should occur three to five years following adoption of TLMP and at approximately five-year intervals thereafter.

In 1999 extensive monitoring was undertaken on the Tongass to assess the adequacy of the scenery standards and guidelines in the Forest Plan. Four viewsheds were analyzed across the Tongass. The results were documented in the 1999 TLMP monitoring report.

In 2000, because of very limited funding, staffing and other priorities, no formal effectiveness monitoring of Forest development activities based on TLMP scenery monitoring protocols took place similar to that which was done in 1999.

Since the adoption of the Forest Plan in 1997 very little harvest of planned timber sales has occurred which used the Plan's scenery standards and guidelines. Some small timber sales have been recently implemented which were planned using the current Forest Plan's standards and guidelines. These harvested areas will be the focus of future monitoring activities to determine if the results of this harvest can adequately address the TLMP monitoring question. Funding for monitoring activities, however, appears to be limited at this time. Therefore, the amount of formal monitoring conducted in these possible areas will depend upon the level of funding allocated.

Soil and Water

Goals: Maintain soil productivity and minimize soil erosion from land-disturbing activities. Minimize sediment transported to streams from land-disturbing activities. Maintain and restore the biological, physical, and chemical integrity of Tongass National Forest waters.

Objectives: Attain Alaska Region (R-10) Soil Quality Standards. Attain State of Alaska Water Quality Standards.

Background: Implementation of Soil and Water standards and guidelines is necessary to maintain soil productivity and water quality. The Soil and Water standards and guidelines are implemented as Best Management Practices (BMPs) described in FSH 2509.22. Region 10 Soil Quality Standards are documented in FSM 2554. Methods for effectiveness monitoring of Soil Quality Standards are also referenced in FSM 2554. Soil conservation practices are practices used to ensure that ground-disturbing activities will meet the R-10 Soil Quality Standards. Typical soil conservation practices include log suspension requirements in timber harvest units and the use of full-bench and end-haul road construction techniques on landslide-prone terrain. Implementation monitoring evaluates whether or not soil conservation practices were required and implemented. Effectiveness monitoring determines whether or not the soil conservation practice used kept the ground-disturbing activity within the R-10 Soil Quality Standard.

The State of Alaska Water Quality Standards set standards for chemical, physical and biologic parameters of waters on National Forest System Lands. The Forest Service in Region 10 uses Best Management Practices and site-specific prescriptions to meet State of Alaska Water Quality Standards when implementing ground-disturbing activities on National Forest System lands.

Soil and Water Question 1: Are the standards and guidelines for Soil Disturbance being implemented?

The Best Management Practices (BMPs), described in the Soil and Water Conservation Handbook (Forest Service Handbook 2509.22, October 1996), define practices that protect soil and water resources. The Soil and Water standards and guidelines define site-specific measures to protect the resources. These standards and guidelines were monitored following a methodology described in the Tongass Monitoring Strategy. The strategy was developed to provide direction for Tongass Land Management Plan implementation monitoring.

The FY 2000 BMP Monitoring Report provides details on how the monitoring was conducted. This report is included in the Appendix. Additional information on the implementation monitoring is described in Soil and Water Question 3. A summary of the findings for the soil resources relative to disturbance is given below.

The BMP implementation monitoring included two distinct efforts: (1) 100 percent monitoring of the units closed out and roads final completed, and (2) Interdisciplinary Team (IDT) monitoring. The 100 percent monitoring was conducted primarily by Forest Service sale administrators and engineering representatives, with assistance from resource specialists in a few circumstances. The IDT monitoring was conducted by a team of representatives from the Forest Service and other Federal and State agencies, which included sale administrators, engineers, foresters, planners, and resource specialists from soils, water and fisheries. IDT monitoring was conducted on a stratified random sample. The IDT sample represents 45 percent of the road sites monitored on 37percent of the different roads and 17 percent of the units monitored during the100 percent BMP implementation monitoring effort.

The monitoring showed that the Tongass National Forest is implementing the standards and guidelines for soil disturbance successfully. There were few departures from full implementation that were noted, and these departures were, in most cases, corrected prior to the road and unit being finaled or closed. In a few cases, following the monitoring, action plans were developed to complete additional work to fully implement the BMP.

BMPs Applicable to Soil Disturbance

BMP 12.7/ 14.5/ 14.8 Measures to Minimize Surface erosion
BMP 12.17 Revegetation of Disturbed Areas
BMP 13.5 Identification & Avoidance of Unstable Areas
BMP 13.9 Yarding Systems to Protect Soil/ Water Resources
BMP 13.10 Landing Location & Design
BMP 13.11/ 13.14/ 14.5 Erosion Control Measures- Temporary Roads & Units
BMP 14.7/ 14.12 Measures to Minimize Mass Failures/ Control of Excavation & Sidecast
BMP 14.8 Surface Erosion
BMP 14.9 Drainage Control Structures to Minimize Erosion & Sedimentation
BMP 14.18 Control Rock Pit Sediment
BMP 14.20/ 14.22 Road Maintenance/ Access Management
BMP 14.26/ 14.27 LTF Surface erosion Control Plan, Storm Water Prevention Pollution Plan

Monitoring Results

100 Percent Monitoring

The 100 percent monitoring effort consisted of monitoring 71 road sites on 35 different roads recorded on 61 forms, and 210 units recorded on 165 forms. The IDT monitoring effort consisted of monitoring 35 units and 32 road sites on 13 different roads. This monitoring covered 5,364.3 acres of harvest units. Table 2.16 shows the number of times the BMPs specific to soil disturbance were monitored and BMPs were implemented.

Table 2.16 — BMPs Implemented: Recorded on Unit and Road Forms

BMPs Applied	Number of Times the BMP was Appropriate for Use	Number of Departures from Full BMP Implementation	Number of Times Corrective Action Implemented
12.7/ 14.5/ 14.8	41	0	0
12.17	56	1.5 (3%)	6 (11%)
13.5	73	0	0
13.9	157	1	3 (2%)
13.10	138	3 (2%)	4 (3%)
13.11/ 13.14/ 14.5	131	1 (1%)	0
14.7/ 14.12	20	0	0
14.9	37	0	0
14.18	0	0	0
14.20/ 14.22	21	0	0
14.26/ 14.27	81	0	0
Totals	**755**	**6.5 (1%)**	**13 (2%)**

Summary details on the departures by BMP are listed in the BMP Summary Report included in the Appendix. In order to comply with the standards and guidelines, corrective actions were taken during timber sale administration. These corrective actions are also described in the BMP Summary Report.

10 percent IDT Monitoring

A total of 210 units and 71 road sites (on 35 different roads) were monitored this year through the 100 percent implementation monitoring process. A subset of 35 units and 32 road sites (on 13 different roads) were monitored during the 10 percent IDT monitoring process. The 10 percent monitoring was completed on five districts in eleven geographic areas and seventeen harvest and road construction areas as listed below:

Craig RD: Polk Inlet (East Polk TS, Whistle Stop TS, Polk culvert), Twelve Mile Arm (East 12 Mile TS), Little Coal Bay (Little Coal Bay TS): monitored 9 units and 1 culvert site (1 road).

Thorne Bay RD: Naukati-Sarkar (Naukati-Sarkar TS), Steelhead (Big Dewey TS, Steelhead Bridge), North Thorne (North Thorne TS, Control Center TS): monitored 12 units and 2 bridge sites (1 road).

Ketchikan RD: Shoal Cove, Shelter Cove (culverts): monitored 11 culvert sites (7 roads).

Hoonah RD: Whitestone Harbor, Freshwater Bay (culverts): 20 culvert sites (4 roads).

Petersburg RD: Portage Bay (Bohemia TS), Kuiu (Saginaw TS, Crane TS): monitored 14 units.

During IDT monitoring the group noted soil, visual, timber, stream and buffer characteristics relative to the management practices. Specifically in shovel logging units, we looked at soil compaction, soil disturbance, slope gradient limitations, and retention. In the helicopter units, we reviewed partial retention, soil disturbance, visuals, stream buffers and stream disturbance. In the running skyline and high lead logging, we focused on streams, buffers, and soil disturbance. In the road review, we looked at the reconstruction of the culverts relative to fish passage. A complete summary of this IDT review can be found in the Appendix.

Summary of Monitoring Results

Generally 10 percent quality control monitoring completed by the IDT showed agreement with the monitoring completed by the sale administrators and engineering representatives. Monitoring showed that Best Management Practices (BMP) were implemented. There was some discussion as to whether one minor incident that was a departure from BMP implementation caused the entire unit to be rated as a departure for that item. The rating should reflect the significance of the departure and the impact on the soil, water, and timber resources. There was minimal confusion identified on completion of the forms and interpretation of the rating system; the new format proved to be a significant improvement.

During the IDT monitoring the group noted identified strengths associated with BMP implementation and a few BMPs that need continued emphasis.

Identified strengths of BMP implementation relative to soil disturbance included:

BMP 12.7/ 14.5/ 14.8 Measures to Minimize Surface Erosion
BMP 12.17 Revegetation of Disturbed Areas
BMP 13.5 Identification and Avoidance of Unstable Areas
BMP 13.9 Yarding Systems to Protect Soil/ Water Resources
BMP 13.10 Landing Location and Design
BMP 13.11/ 13.14/ 14.5 Erosion Control Measures for Units & Temporary Roads
BMP 14.26/ 14.27 LTF Surface Erosion Control Plan/ Storm Water Pollution Prevention

Identified emphasis items relative to soil disturbance included:

BMP 12.7/ 14.5/ 14.8 Measures to Minimize Surface Erosion
BMP 12.17 Revegetation of Disturbed Areas
BMP 13.10 Landing Location and Design
BMP 13.11/ 13.14/ 14.5 Erosion Control Measures on Temporary Roads
BMP 14.14/ 14.17 Culvert Design/ Installation & Removal

High quality work on the part of the sale administrators and layout crews was noted in identifying streams and adding implementation of stream course protection measures for streams that were missed in the planning and layout phases of unit preparation. Extraordinary work was completed on the part of the sale administrators in working with shovel operators to limit soil disturbance and keep retention trees in shovel logging units. Little evidence of the shovel yarder was apparent and in some of the shovel units no soil disturbance was apparent. The sale administrators have worked with the operators to remove puncheon, fluff soil and cover shovel tracks with tree debris in an effort to minimize soil erosion. Emphasis will continue on identifying streams missed during sale preparation, seeding temporary roads, ensuring water bars are functional, and seeding, slash covering, and avoidance of ruts associated with shovel logging. During completion of the roads and post haul maintenance, continued emphasis is being placed on BMPs to ensure adequate numbers and spacing of cross drainage ditches and water bars to minimize erosion and sedimentation, and seeding.

Specific Ratings

Specifically examining the ratings from the IDT Implementation Monitoring Trip, a total of 35 harvest units were monitored consisting of 21 harvest units in the Ketchikan vicinity and 14 harvest units in the Petersburg vicinity. Only two harvest units monitored by the IDT showed individual partial departures from full BMP implementation. The IDT team monitored 32 culverts/bridges (20 culverts in the Hoonah vicinity, and 12 culverts/ bridges in the Ketchikan vicinity). The 12 culvert/bridge installations in the Ketchikan vicinity showed full BMP implementation, with only a culvert sizing issue raised at one culvert site. Out of the 20 culverts monitored in the Hoonah vicinity, 16 showed full BMP implementation. Details of the Hoonah trip are included in a separate trip report, *"IMEG Monitoring Trip Report: Hoonah Ranger District, August 22-23 2000."*

The IDT was split on the two departure ratings because there was a difference of opinion about what constituted a departure. We concluded that the rating system was a tool for communication and that the focus should be on emphasis items. We agreed that the monitoring intent was to ensure resource protection through implementation of the BMPs. Details of the discussion on the strengths associated with the BMP implementation as well as the specific emphasis items are included in the BMP Summary report and IDT reports included in the Appendix.

Evaluation of Monitoring Results

The standards and guidelines for soil disturbance are being implemented during timber sale administration and road construction. The sale administrators and engineers have a strong understanding of the BMPs and actions necessary to implement the associated standards and guidelines. Continued emphasis is necessary on adequate culvert installations, ditch dams and water bars, and seeding bared soil slopes. Emphasis is also necessary on limiting shovel yarding ruts and covering ruts with vegetative debris as well as fluffing and seeding ruts. Application of partial suspension and full suspension has contributed to limit soil disturbance.

There was general consistency on the rating process on the 100 percent sample. Technical assistance and training with BMP form interpretation on the Tongass NF was provided in fiscal year 2000. These efforts and the increased experience of the sale administrators with the BMP implementation monitoring contributed to significantly improve our monitoring effort. There was minimal confusion identified on completion of the forms and interpretation of the rating system. Roughly 10 percent of the units were monitored using the FY 1999 monitoring form so some of the items added or emphasized in FY 2000 were not included on all the units. The form's new format proved to be a significant improvement over the previous editions. The data reported was significantly more consistent and complete. The primary issues had to do with whether the BMP applied to the unit or road. Issues relative to the BMPs were specifically associated with the corrective actions and departures. A few questions were raised about what constituted less than full BMP implementation. There were some questions raised on the 10 percent IDT sample about the monitoring rating system and the specific definition of what constituted a departure. The definition of departure and the rating system will be further defined prior to the fiscal year 2001 field season.

The IDT observed the sale administrators and engineering representatives have a strong understanding of the BMPs, and work to implement these BMPs on the ground. The sale administrators, engineering representatives, and contracting officer's representatives have responsibilities for implementation of many of the BMPs through administering the timber sale and public works contracts. They closely inspect these contracts and work with the operators to ensure compliance with many of the BMPs. Through the hard work and diligent efforts of the sale administrators, engineering representatives and contracting officers representatives, the BMPs are implemented on the ground. The IDT monitoring of the Tongass this year shows that the sale administrators, engineering representatives, and contracting officers representatives are consistently implementing these BMPs fully and monitoring them following the same criteria as the IDT. This is a trend that has continued to improve over the past three years until we are now nearly at 100 percent full implementation of the BMPs. We need to consider moving toward monitoring a smaller sub-set of the roads and units.

The IDT recommends focusing on emphasis items rather than the specific rating for the BMP. The group feels that this trip should be a communication opportunity to discuss interpretation of implementation of the BMPs. The group does not feel that it is significant to focus on the specific ratings. The orientation of the group is toward interpretation and implementation rather than a rigorous inspection of detail.

Recommendations follow to change the monitoring process and monitoring form. Suggestions include the concept that the IDT monitoring be accomplished through a dual effort with a smaller IDT team and a larger staff IDT group. Individuals with logging system expertise and road construction expertise need to be included in these groups. Recommendations specific to the form include changing the monitoring rating system and simplifying the form. Other monitoring, inspection, and functional assistance trips should be utilized to collect monitoring information and fill out monitoring forms.

This monitoring question is covered in its entirety in the annual BMP monitoring report. In this report, it is duplicated as Soil and Water Question 1, Fish Question 2, and Wetlands Question 1.

Soil and Water Question 2: Are the standards and guidelines effective in meeting Alaska Regional Soil Quality Standards?

Soil and water effectiveness monitoring is completed through monitoring the soil quality standards as described in Forest Service Manual 2554, and is summarized in this report.

This question is addressed in two parts: 1) Soil Disturbance, and 2) Landslide inventory.

Part 1: Soil Disturbance

This monitoring completed in fiscal year 2000 is effectiveness monitoring of BMP 13.9 "Determining Guidelines for Yarding Operations." A statistical review of the two sets of soil disturbance data from the 89-94 KPC Area was completed in January and February of 1999. The results of the statistical review were documented in a five-page white paper, and presented to the Tongass soil scientists in March of 1999 (Landwehr and Nowacki, 1999).

Monitoring Results

The Regional Soil Quality Standards allow up to 15 percent of an activity area (harvest unit) to be in a detrimental soil condition. Data in Table 2.17 indicate that both full and partial suspension are well within this standard.

Table 2.17 — Mean Soil Disturbance Levels on 23 Steep-slope Harvest Units (249 Transects)

Treatment	Number of Units	Total Disturbance	Confidence Interval	Detrimental Disturbance	Confidence Interval
Partial Suspension	12	6.4%	1.3	3.0%	1.5
Full Suspension	11	2.9%	1.5	1.8%	1.4

Data on shovel yarding presented in Table 2.18 indicate that this is also well within the standard, as detrimental soil disturbance cannot exceed total disturbance. Mean values are all well within established standards, and no individual harvest unit has exceeded the standard. Soil displacement was the most common soil disturbance, accounting for 79 percent of the detrimental impacts documented (Landwehr, 1997).

Table 2.18 — Mean Soil Disturbance Levels on the Total 31 Miles of Transect in 56 Harvest Units

Treatment	Number of Units	Total Disturbance	Confidence Interval
Shovel Yarding	8	4.8%	2.1
Partial Suspension	35	5.7%	1.3
Full Suspension	13	2.6%	1.5

Evaluation of Results

Considering the monitoring results, Tongass NF soil scientists concluded that the existing body of data is adequate to answer Soil and Water Question 2. The standards and guidelines are effective in meeting Alaska Regional Soil Quality Standards. For FY 2000, no new monitoring of mean soil disturbance was completed by the Tongass NS soil science team and no harvest areas with road problems were identified.

Soil scientists recommend that further data collection is not necessary, except perhaps to evaluate individual harvest units where soil disturbance problems are identified or to evaluate the effects of new or different logging techniques.

Part 2: Landslide Inventory Guidelines

The landslide inventories were conducted in the Margaret Lake area and Traitor's Creek area to satisfy eight goals: 1) To determine the main mechanics driving the numerous landslides that occurred in the Margaret Lake Watershed between 1995 and 1999; 2) To determine to what extent our management practices (timber harvest and roads) contributed to the existing Margaret landslides and how much of this situation is natural; 3) To determine if past Forest Service timber harvest practices were consistent with Best Management Practices and followed TLMP standards and guides at the time those harvest activities occurred; 4) To determine if our practices were consistent with current BMP's and standards and guidelines; 5) To determine what additional measures the Forest Service can take to avoid landslides in the future; what can we learn from this experience; 6) To determine what restoration opportunities may exist in the Margaret Watershed; 7) To determine the impact of the four main landslides which directly affected the stream system; and 8) To determine how the Forest Service may monitor the affects of past landslides regarding landslide occurrence on stream channel conditions and fish habitat within the Margaret Lake Study Area.

This area was selected for landslide study and investigation to determine what impacts such failures may have on the existing fish habitat, since the Pacific Northwest Research Station had previously completed six years of past Margaret Creek stream surveys (between 1989 and 1996) and had established permanent baseline data cross-sections in Margaret Creek upstream from Margaret Lake. The specific monitoring completed is effectiveness monitoring of BMP 13.5, "Identification and Avoidance of Unstable Areas," and BMP 14.7, "Measures to Minimize Mass Failures." This monitoring included evaluation of a landslide inventory in the Margaret Lake Watershed, which is located 20 miles north of Ketchikan, Alaska.

Landslide inventories of the Margaret Lake Watershed Area were completed in two individual studies. The first landslide assessment project only took into account the identified landslides, which occurred between 1995 and 1999 within the Margaret Lake Watershed. This assessment process documented a total of 19 landslides located within the Margaret Lake Watershed area, and an additional nine landslides were found to be present outside of the Margaret Lake Watershed. It should be noted that the nine landslides located outside of the Margaret Lake Watershed Area did not receive an in-depth analysis based on the failure locations. Of the 19 landslides located within the Margaret Lake Watershed, an in-depth analysis was completed to identify the key reasoning for landslide failure occurrence (management vs. natural). This study documented that of the 19 landslides within the Margaret Lake Watershed area, 14 were found to have occurred during the winter and spring of 1999, one landslide in 1998, two landslides in 1997, one landslide in 1996, and one landslide in 1995. Of the 19 landslides located within the Margaret Lake Watershed, 15 (79 percent) were found to be associated with past management activities while four landslides (21 percent) occurred naturally in unmanaged old-growth stands. Over 80 percent of the landslides within the Margaret Lake Study Area were reviewed on a site-by-site assessment process to determine the potential reasoning for failure. The length and width of each landslide was measured with a cloth tape, and slope initiation angle measured to the nearest percent. The initial landslide inventory was completed in late fall of FY 1999. A report entitled "Mechanics Driving Landslide Occurrence in Margaret Lake Basin (1995-1999)" was completed in March 2000 and the data presented to the Ketchikan-Misty District Ranger in July 2000.

In late summer (August) of 2000, a second landslide study was initiated in the vicinity of the Margaret Lake Basin to determine if any additional landslides had occurred as a result of a heavy rainfall event. This time the assessment was not specific to only those landslides located within the Margaret Lake Watershed, and also took into account those slope failures found to be present in the surrounding watersheds. This assessment was completed primarily by aerial reviews. During the aerial surveys an additional nine landslides all were identified directly within the Margaret Lake Watershed and were identified as occurring during August 2000, while an estimated 10 landslides were found to be present in the Traitors Creek Watershed (located due northeast and adjacent to Margaret Creek Watershed). Of the August 2000 landslides (located in both Margaret and Traitors Creek watersheds), 100 percent were found to either initiate from road prisms or in areas of younger stand age.

Monitoring Results

In response to the eight goals/questions that were reviewed within the Margaret Lake Watershed, the summary conclusions are as follows:

What are the main mechanics driving the numerous landslides that occurred in the Margaret Lake Watershed between 1995 and 1999?

> In summary the main mechanics driving the landslide failures as described by Bishop and Stevens (1964) were "shear stress" during the heavy precipitation events in 1999, and road construction and "shear strength" in association with weak parent materials and past harvest activities.

To what extent did our management practices (timber harvest and roads) contribute to the existing Margaret landslides and how much of this situation is natural?

> In summary the landslides were broken down into three groupings (past management stands, road failures, and old-growth failures). The clearcut activities account for 47 percent, road failures account for 32 percent and the remaining 21 percent are related to landslides that originated in old-growth stands.

Were the past Forest Service timber harvest practices consistent with Best Management Practices and did they follow TLMP standards and guides at the time those harvest activities occurred?

> Overall, it was determined that the practices completed within the Margaret Lake Watershed were consistent with the Best Management Practices/TLMP standards and guidelines at the time those harvest activities occurred.

Were our practices consistent with current BMP's and standards and guidelines?

> The practices were not consistent. Following 1989 a signature on a NEPA document was necessary to constitute approval of harvest. Most NEPA documents at the time period when these harvest activities occurred do not provide a list or accounting of proposed timber harvest and road building on slopes exceeding 72 percent.

What additional measures can the Forest Service take to avoid landslides in the future; what can we learn from this experience?

> Future landslide avoidance can be achieved by avoidance of harvest on slopes exceeding 72 percent in areas of unstable soils. TLMP standards and guides also state that no-cut windfirm buffers are required on all identified Class III stream courses. A modification of standards and guides can only be implemented on Class III streams if a fisheries biologist completes a site-specific watershed analysis that verifies that the standard and guideline modification will not affect downstream fish habitat.

What restoration opportunities may exist in the Margaret Watershed?

> Outyear funding was set aside to revegetate the landslides; funds were used to remove the spur roads no longer needed; three settling ponds were placed at the toe slopes of the main slides that contributed sediments to Margaret Creek; and within the Margaret Creek riparian area some thinning was completed to open up the stand, thus enhancing stand development and adding woody material to Margaret Creek.

What were the impacts of the four main landslides that directly affected the stream system?

> In summary due to the high level of sedimentation that was present in Margaret Creek between May and November in Margaret Creek, some negative impacts to egg incubation may have occurred in 1999. However, due to the complexity of Margaret Creek and salmon production, it is difficult to quantify what impacts the landslides had on overall production.

How may the Forest Service monitor the affects of past landslides regarding landslide occurrence on stream channel conditions and fish habitat within the Margaret Lake Study Area?

> The monitoring alternative selected was for the Forest Science Lab to re-map the Margaret Creek stream system following the same transects. This would provide a means for comparing the stream channel configurations prior to the 1999 flood event with the channel conditions following the 19 landslides that occurred between 1995 and 1999. Monitoring landslide restoration and activities that occur in the Margaret Lake Watershed is planned in the future.

Numerical Results of the Landslide Study:

Of the 28 documented landslides located within the Margaret Lake Watershed, 23 of the landslides (82 percent) occurred during two major storm events (May and August) in 2000. Three slides were associated with road construction, sixteen slides with harvest units, and four slides occurred in non-harvested old-growth timber stands. For the remaining landslides, which occurred between 1995 and 1999, three landslides occurred in clear cuts, one landslide was initiated from a road prism, and one landslide was initiated as a natural debris flow. The Margaret Lake Watershed landslides represent approximately 3,402 acres of timber harvest and approximately 25 miles of specified road construction. The total area impacted by the Margaret Lake landslides is approximately 76 acres, with individual landslides ranging between ¼ acre and 10+ acres in size. Six of the landslides in the Margaret Lake Watershed directly entered fish habitat. Stream surveys of this habitat indicate that although the sediment entered the streams, no significant impact to the habitat could be determined. The streams showed no significant deposition of sediment. Detailed investigations showed that most of the sediment reaching the channels was transported to Margaret Lake. Additional study of the fish habitat to quantify impact is planned. (For further details of this monitoring, see Geier, 2000.) Note that the numbers above do not take into account those failures that occurred outside of the Margaret Lake Watershed as well as the landslides within the Margaret Lake Watershed that occurred in August 2000.

Evaluation of Results

Tongass soil scientists agree that additional landslide inventories and data gathering are needed to adequately answer this monitoring question. The report referenced in the previous section provides some preliminary indications of landslide extent and occurrence relative to the effectiveness of our identification of unstable areas and measures to minimize mass failures. A landslide inventory protocol for monitoring the effectiveness of BMP 13.5 is being developed. Additional landslide inventory work is anticipated to continue into fiscal year 2001.

At the August 2000 soils meeting, soil scientists suggested additional data analysis items for the existing landslide data. They would like to identify the statistical break for landslide initiation angles in harvest units. This data analysis requires a slope map with relatively fine slope breaks. At this time the Light Detection and Ranging (LIDAR) Technology is available to provide a detailed slope map to determine the statistical break of existing landslide data.

Soil and Water Question 3: Are Best Management Practices being implemented?

The Best Management Practices (BMPs) were monitored on the Tongass National Forest, using guidelines described in the Tongass Monitoring Strategy. The strategy was developed to provide direction for TLMP implementation monitoring. An interagency team of representatives from the Forest Service and Alaska Department of Environmental Conservation selected specific BMPs to be monitored, based upon potential risk factors to soil and water resources. Members of the Monitoring and Evaluation Group (IMEG) then reviewed their selection. The BMPs evaluated are included in the Soil and Water Conservation Handbook (Forest Service Handbook 2509.22, October 1996). Soil and water effectiveness monitoring is completed through monitoring the soil quality standards as described in Forest Service Manual 2554, and is summarized in this report.

The BMP implementation monitoring included two distinct efforts: (1) 100 percent monitoring of the units closed out and roads completed, and (2) 10 percent interdisciplinary team (IDT) monitoring. The 100 percent monitoring was conducted primarily by Forest Service sale administrators and engineering representatives, with assistance from resource specialists in a few circumstances. A team of representatives from the Forest Service and other Federal and State agencies conducted the IDT monitoring. This team included sale administrators, engineers, foresters, planners, and resource specialists from soils, water and fisheries. IDT monitoring was conducted on a stratified random sample made up of more than 10 percent of units and roads monitored during the 100 percent monitoring effort

The monitoring showed that the Tongass National Forest is implementing the Best Management Practices successfully. There were few departures from full implementation that were noted. In a few cases, following the monitoring, action plans were developed to complete additional work to fully implement the BMP.

Monitoring Context

Planning for some of the roads and units was completed before the Soil and Water Conservation Handbook was revised in October 1996, and new Forest Plan standards and guidelines were approved in May 1997. Both documents included many improvements for protecting soil and water resources. Several important changes in the 1996 Soil and Water Conservation Handbook include improving wetlands management direction, considering stream buffer windthrow, and generally making Forest Service BMPs consistent with State Forest Practices Regulations. A few of the important changes included in the 1997 TLMP FEIS and the revised Forest Plan standards and guidelines resulted in new stream class definitions, and stream protection measures required for each stream class and channel type. Buffer strip protection of Class III streams was entirely new.

<u>Applicable BMPs</u>

BMP 12.5 Wetlands Protection Measures
BMP 12.6/ 12.6a Riparian Area Designation & Protection/ Buffer Zone Design and Layout
BMP 12.7/ 14.5/14.8 Measures to Minimize Surface Erosion
BMP 12.8/ 12.9 Oil Pollution Control Measures
BMP 12.17 Revegetation of Disturbed Areas
BMP 13.5 Identification and Avoidance of Unstable Areas
BMP 13.9 Yarding Systems to Protect Soil/ Water Resources
BMP 13.10 Landing Location and Design
BMP 13.11/ 13.14/ 14.5 Erosion Control Measures for Units & Temporary Roads
BMP 13.16 Stream Channel Protection
BMP 14.6 Timing Restrictions for Construction Activities/ Fisheries Prescription
BMP 14.7/14.12 Measures to Minimize Mass Failures/ Control of Excavation & Sidecast
BMP 14.9 Drainage Control Structures to Minimize Erosion & Sedimentation
BMP 14.14/ 14.17 Design & Installation of Bridges and Culverts
BMP 14.18 Control Rock Pit Sediment
BMP 14.20/ 14.22 Road Maintenance Access Management
BMP 14.26/ 14.27 LTF Surface Erosion Control Plan, Storm Water Pollution Prevention Plan

Monitoring Results

100 percent Monitoring

The 100 percent monitoring consisted of monitoring 71 road sites on 35 different roads recorded on 61 forms, and 210 harvest units recorded on 165 forms. In some cases multiple road sites or multiple units were recorded on the same form. This monitoring covered 5364.3 acres of harvest unit area.

The 100 percent monitoring effort is summarized in Table 2.19. This table displays the total number of times each specific BMP was rated, the number of times it was fully implemented, number of times a departure from full implementation occurred, and the number of times departures from full implementation of BMPs were corrected. In most cases where departures were observed, corrective action was taken so that the BMP was fully implemented before the unit or road was approved by either the sale administrator or contracting officer's representative. In a few cases, the monitoring resulted in action plans being drawn up to complete additional work so the BMP would be fully implemented.

Table 2.19 — Summary of BMP Use, Number of Departures, and Corrective Actions

BMPs Applied	Number of Times the BMP was Appropriate for Use	Number of Departures from BMP Implementation	Number of Times Corrective Action Implemented
12.5	89	0	0
12.6/ 12.6a	95	1 (1%)	5 (5%)
12.8/ 12.9	139	0	6 (4%)
12.17	56	1.5 (3%)	6 (11%)
13.5	73	0	0
13.9	157	1 (1%)	3 (2%)
13.10	138	3 (2%)	4 (3%)
13.11/ 13.14/ 14.5	131	1 (1%)	0
13.16	131	2 (2%)	5 (4%)
12.7/ 14.5/ 14.8	41	0	0
14.6	43	0	0
14.7/ 14.12	20	0	0
14.9	37	0	0
14.14/ 14.17	56	2 (4%)	0
14.18	0	0	0
14.20/ 14.22	21	0	0
14.26/ 14.27	81	0	0
	1,308	**11.5 (1%)**	**29 (2%)**

10 percent IDT Monitoring

The 10 percent monitoring was completed in 11 geographic areas and 17 harvest and road construction areas on the Craig, Thorne Bay, Ketchikan, Hoonah, and Petersburg ranger districts. The Interagency Monitoring and Evaluation Group (IMEG) selected the monitoring locations based upon significant aspects of the unit harvest and road construction associated with these areas. A subset of the total BMP implementation monitoring pool consisting of 35 units and 32 road sites (on 13 different roads) were monitored during the 10 percent IDT monitoring process. Specific details about this monitoring effort are summarized in the Soil and Water Question #1.

Generally, 10 percent quality control monitoring completed by the IDT was in agreement with the monitoring completed by the sale administrator and engineering representative, and showed that the BMPs were being implemented.

During IDT monitoring, the group noted identified strengths associated with BMP implementation and a few BMPs that need continued emphasis. Identified strengths of BMP implementation included:

- Riparian area designation and implementation of buffers;
- stream channel protection;
- measures to minimize soil erosion;
- revegetation of disturbed areas;
- identification and avoidance of unstable areas;
- yarding systems to protect soil and water resources;
- landing locations and design;
- timing restrictions for construction activities/ fisheries prescription;
- design and installation of culverts;
- erosion control measures and plans;
- oil pollution control measures; and
- LTF surface erosion control/ storm water pollution prevention.

In the harvest units, continued emphasis is focused on minimizing soil disturbance during yarding operations and associated mitigation covering bared soil with vegetative debris and seeding. Emphasis is also being placed on BMPs to ensure adequate numbers and spacing of drainage control and relief structures to minimize erosion and sedimentation, road/ ditch maintenance, and seeding of temporary roads.

During completion of the roads, continued emphasis is being placed on seeding bared soil exposed in road cuts and providing required fish passage at culvert sites. Focus on the design of the culverts specific to the site will be emphasized on sites where the natural stream gradient is relatively high or the stream channel shows stepped banks or gradients upstream or downstream of the crossing sites. At these sites, detailed survey and investigation will be conducted to provide data for stream simulation and specific site designs.

Overall, the sale administrators and engineering representatives demonstrated diligence in implementing appropriate protection of the stream courses, as well as prescribed suspension, effective culvert/ water bar installation, and minimizing of sedimentation. The terrain in some of these units was excessively steep, requiring extensive efforts on the part of the sale administrators to implement the BMPs. The sale administrators worked carefully to identify streams missed during the environmental assessments and during layout, and implemented the appropriate stream protection measures. The sale administrators worked closely with the contractors on some of the shovel units to employ this logging system on relatively steep ground and effectively remove the logs with minimal disturbance to the soils and forested wetlands.

There were numerous cases where the 10 percent IDT identified strengths and a few cases of concerns. These strengths and concerns are summarized in the tables included in the BMP Summary Report in the Appendix.

The IDT identified strengths associated with the following BMPS:

BMP 12.5 Wetlands Protection Measures
BMP 12.6/ 12.6a Riparian Area Designation & Protection/ Buffer Zone Design and Layout
BMP 12.7/ 14.5/14.8 Measures to Minimize Surface Erosion
BMP 12.8/ 12.9 Oil Pollution Control Measures
BMP 12.17 Revegetation of Disturbed Areas
BMP 13.5 Identification and Avoidance of Unstable Areas
BMP 13.9 Yarding Systems to Protect Soil/ Water Resources
BMP 13.10 Landing Location and Design
BMP 13.11/ 13.14/ 14.5 Erosion Control Measures for Units & Temporary Roads
BMP 13.16 Stream Channel Protection
BMP 14.6 Timing Restrictions for Construction Activities/ Fisheries Prescription
BMP 14.14/ 14.17 Design & Installation of Bridges and Culverts
BMP 14.26/ 14.27 LTF Surface Erosion Control Plan, Storm Water Pollution Prevention Plan

Emphasis items were associated with the following BMPs:

BMP 12.17 Revegetation of Disturbed Areas
BMP 13.11/ 13.14/ 14.5 Erosion Control Measures for Units & Temporary Roads
BMP 14.14/ 14.17 Design & Installation of Bridges and Culverts

Details about the IDT trips are included in the IDT trip reports in the Appendix. Summary of the IDT trip to Hoonah is included in this section to highlight one of the Tongass National Forest emphasis areas of fiscal year 2000. This trip focused on monitoring culvert replacement sites.

10 Percent IDT Best Management Practices Monitoring Trip: Hoonah

A field trip to the Hoonah Ranger District, on August 22-23, 2000, was conducted as a part of the annual interagency Best Management Practices (BMP) Implementation/Effectiveness Monitoring effort. The purpose behind the Hoonah visit was to inspect culvert replacements to determine if the BMP was implemented correctly, and to determine the effectiveness of the BMP, as applied in a given instance.

Background

A 1996 Regional Office activity review of Hoonah District system roads identified the need for further study on the effects of culvert design and maintenance on upstream migration. A monitoring project, funded through the Environmental Protection Agency, was initiated in 1997. The objectives of the monitoring project were: Identify physical conditions that impede fish migration at Class I and Class II stream crossings; sample fish above and below stream crossings and estimate area of potential habitat loss associated with road-related migration barriers; and identify maintenance needs and opportunities for restoring access to fish habitat.

Sampling was focused on road segments identified in previous surveys as having significant numbers of culverts that restrict upstream fish migration. These included segments of road in the Game Creek, Freshwater Creek, Iyouktug Creek and Pavlof River watersheds on Northwest Chichagof. A summary of the procedures and findings, titled *Fish Passage at Selected Culverts Crossings on the Hoonah District Road System*, was compiled by Chris Riley and Steve Paustian (3/99).

There were 32 stream crossings identified as potential barriers to fish migration. Of these, 13 were identified as Class I streams; all 13 were determined to present actual barriers to movement by adult and/or juvenile anadromous fish. The remaining 19 streams were classified as Class II (containing resident fish). Seventeen of these were determined to have barriers to fish migration.

In 1998, plans were made to replace the culverts identified as fish barriers during the field survey. A contract was prepared using the BMPs, TLMP standards and guidelines, and stream crossing construction specifications applicable at the time. The contract period was set to coincide with the "fish window" of June 1 – July 15. ADF&G was consulted, conforming to the conditions of the March 1998 Memorandum of Understanding on in-stream work.

The work under the contract involved removing the existing culvert, replacing it with one of proper size, and assuring that it was installed to provide fish passage for adults and juvenals. To date, 39 culverts have been replaced under two different contracts, with work occurring in 1998, 1999, and 2000. Work has occurred in the Game Creek, Freshwater Creek, Iyouktug Creek, Pavlof River, and Neka River watersheds. Priorities were the problem barriers identified in the study, and the "worst of the worst" of culverts identified in subsequent surveys.

Implementation Monitoring Results

The purpose of the monitoring trip was to look at replacement culverts on existing road systems. The applicable Best Management Practices were 14.6 – Timing Restrictions for Construction Activities, and 14.14/14.17 – Bridge/Culvert Design, Installation & Removal. The original culvert locations were determined during the initial road construction. The location was on what had been determined to be the break between Class I or II stream reaches, and the beginning of the Class III segments. This may or may not have been accurate.

Several of the culverts had been replaced over the life of the road; however, these replacement pipes did not meet the current criteria of allowing fish passage or for sizing.

The team looked at a total of 20 culvert replacements on four road systems in three large watersheds on the Hoonah District. The 20 culverts inspected represented 51 percent of all culverts replaced on the Hoonah road systems; the remaining 19 culverts were on Hoonah road systems that were deemed impractical to access in the time allotted. A complete stream survey was completed on one site (FDR 8508, KP 20.10). The results of this survey will be available at a later date.

Of the 20 culverts investigated on the Hoonah District, two had departures from full BMP implementation, and required corrective action. In addition, three others were installed in compliance with the BMP, but may require some additional work or corrective action. The major problem encountered during the 1999 work season was the presence of abnormally high water flows. A combination of heavy snow accumulation, late snow melt, and heavy rains caused higher-than-normal runoff and stream flow during the "fish window" (June 1 – July 15). Removal of the culverts and the leveling (or bedding) resulted in the surrounding soil to become loosened, which, in turn, resulted in the washing out of the soil. This was a particular problem where the streambed was of alluvial origin, and in areas of very shallow bedrock. This washing sometimes resulted in the formation of headwalls upstream of the culvert. While it was recognized at the time as a problem, it was felt best to proceed during the "fish window," rather than to wait and possibly extend outside the window period. It has since been learned that waivers can be granted for in-stream work outside the window, so this will be a factor in future contracts/replacement work.

A second problem encountered was the use of "typical" installation designs where the site situation was atypical (shallow bedrock, steeper gradients, stream course shifting, differing stream gradient resulting from culvert removal, etc.).

In general, it was found that the replacement pipes were of the proper size for the stream width; there was good application of rock weirs for outlet control; culvert bedding was good, except in the case of 6-percent-plus alluvial channels (excessive head cutting) and channels with shallow bedrock; and timing of in-stream work conformed to the "fish window." In the last case, the BMP for timing was met, but high flows in June 1999 exacerbated erosion and headcutting, causing non-compliance with BMPs 14.14 and 14.17. Sites where problems were identified, or it was determined that some follow-up was desired, will be revisited in the spring of 2001.

A table included in the complete report in the Appendix lists the culverts where concerns were identified, and the departure from BMP implementation or problem identified with the installation.

Summary of Results

The overall results were very good. The majority of the culverts were correctly installed, functioning well, and presented no problem. Approximately 10 percent of the culvert replacements inspected were generally installed in accordance with the Best Management Practice(s) but had less than desirable results. Primary departure from the BMPs was the use of "typical" design criteria/standards in atypical situations/conditions. General recommendations are associated with using non-standard designs in steep gradient non-standard sites.

Recommendations resulting from this monitoring are listed in the IMEG IDT Monitoring Trip Report-Hoonah Ranger District, in the Appendix. These include recommendations of measures to be applied to all culvert replacements, and to specific atypical situations or circumstances.

Evaluation of Results

The results show that the Tongass has successfully implemented the Best Management Practices. The 100 percent monitoring effort consisted of monitoring 71 road sites on 35 different roads recorded on 61 forms, and 210 units recorded on 165 forms. The IDT monitoring effort consisted of monitoring 35 units and 32 road sites on 13 different roads. This monitoring covered 5,364.3 acres of harvest units. Table 2.19 shows the number of times the BMPs specific to soil and water were monitored and BMPs were implemented.

Specific details on the situations that were associated with the departures and corrective actions implemented in response to efforts to implement the BMPs are detailed in the BMP Summary Report included in the Appendix.

Overall, the monitoring showed that the Tongass National Forest is implementing the Best Management Practices successfully. There was general agreement between the 100 percent monitoring effort and the 10 percent IDT monitoring effort. The IDT noted few departures from full BMP implementation. Departures in the units involved falling trees in buffers or streams, and soil disturbance associated with yarding systems. Corrective actions were taken to mitigate the departures. Departures on the roads were associated with culvert installations, and corrective action is recommended on one of the two sites.

Evaluation of the monitoring shows that the sale administrators and engineering representatives effectively utilize the Best Management Practices. Many of the contract clauses in the timber sale and public work contracts require resource protection practices in support of the Best Management Practices. During administration of the contracts, the sale administrators, engineering representatives and contracting officer's representatives work with the operators to ensure compliance with the BMPs. Consistent implementation of the BMPs is occurring on the Forest; where departures arise, the Forest employees work to mitigate impact to the resources. The trend of full implementation has continued to improve over the past three years and we are near 100 percent full implementation of the BMPs. This trend provides evidence that we logically should monitor a smaller subset of roads and units.

The focus of the IDT monitoring should be on emphasis items rather than on the specific ratings. The IDT recommends this monitoring trip should be utilized as an opportunity to review interpretation and discuss strategies to implement the BMPs. Recommendations include reorganizing the IDT monitoring process. IDT monitoring would be accomplished in two trips by a smaller IDT team and a larger staff IDT group. The quality control monitoring would be completed by an IDT team, which is comprised of Forest Service specialists, logging systems specialist, monitoring coordinator, and representatives from ADEC and FWS. This group would review units and roads selected through a stratified random process that examines the relatively same proportion of units harvested with particular logging systems as implemented. The criteria for selecting the units and roads for IDT review should continue to emphasize the areas showing steeper slopes and Class I, II, III, and IV streams. The larger IDT group comprised of Forest Service staff, Forest Service specialists, monitoring coordinator, and representatives should review areas that illustrate implementation of new or controversial standards and guides, timber harvest, and road construction sites during actual implementation of the BMPs and standards and guidelines.

Recommendations specific to the monitoring form include changing the monitoring rating system and simplifying the form. The group recommends changing the rating system for the BMP implementation to

a system that indicates the percentage of full BMP implementation (i.e., rate with a 1-4 reflecting the degree of implementation) in addition to the fully implemented (Y), departure (D), not implemented (N) system. Simplify the form to require fewer entries. The IDT recommends providing specific guidelines on what constitutes a departure.

Other monitoring, inspection and functional assistance trips should be utilized to collect monitoring information and fill out monitoring forms. The other agency IDT group would not necessarily need to be involved with the entire 10 percent quality control sample. The timber sale inspection/certification group and the monitoring effort should be related to complete this work in a time efficient manner and eliminate any duplication of efforts. Any district monitoring completed through district trips or Regional Office functional assistance trips should also be related and utilized to complete some of this monitoring.

Soil and Water Question 4: Are Best Management Practices effective in meeting water quality standards?

Goal: Protect beneficial uses of water including drinking water, and growth and propagation of fish, other aquatic life, and wildlife.

Objective: Study a representative sample of projects where Best Management Practices (BMP's) have been implemented, to determine if BMP's are effective in meeting State water quality criteria (e.g., turbidity, sediment, temperature) or in maintaining physical habitat condition (e.g., gravel embeddedness, pool depth). This monitoring issue is closely related to the fish and riparian effectiveness monitoring information also presented in this report.

Background: Forest roads can have adverse effects on aquatic life, resulting from accelerated erosion and sediment loading, alteration in natural drainage patterns, changes in channel morphology, and increased risk of chemical spills and contamination.[1] The primary focus of FY 2000 water quality monitoring on the Tongass was the effectiveness of road BMP's in mitigating erosion and stream sedimentation, because of potentially significant effects on the growth and propagation of aquatic organisms. Stream temperature monitoring in FY 2000 was also conducted in selected watersheds on Prince of Wales (POW) Island to determine if summer stream temperatures are within State water quality standards. The POW stream temperature program was developed in response to public concerns over large spawning salmon die-offs that occurred in 1993.

Monitoring Question: Are Best Management Practices effective in meeting water quality standards?

Monitoring Results

Tongass water quality effectiveness monitoring activities in FY 2000 included stream turbidity monitoring of new road construction, stream temperature monitoring in temperature sensitive watersheds on Prince of Wales Island, and an interagency review of culvert maintenance and replacement projects on Chichagof Island.

Stream Turbidity

Stream turbidity monitoring during road construction activity is a simple, low-cost observation of a water quality standard that responds to routine effectiveness monitoring outlined in the USDA Forest Service Memorandum of Agreement with the Alaska Department of Environmental Conservation (1992). The basis of the turbidity sampling procedure is to determine if Best Management Practices are effective in preventing water quality degradation from erosion associated with new road construction (using turbidity as the sole parameter of water quality). According to the Alaska Forest Resources and Practices Regulations (11AAC95), "degradation of water quality" means a decrease in water quality such that the affected waters are unable to fully maintain existing or designated uses, but does not include decreases in water quality that are temporary, localized, and reparable. 11AAC95 defines "temporary" as 48 hours or less and "repairable" as an effect that is reversible by natural processes (such that the designated use will return to a state functionally identical to the original).

The Alaska Water Quality Standards (18AAC70, as amended through May 27, 1999) require that, with respect to this "aquatic life" designated beneficial use, turbidity levels may not exceed 25 NTU (nephelometric turbidity units) above natural conditions. The Alaska Water Quality Standards also require that the most stringent criteria for water quality apply to streams unless a variance to change the designated use is granted. The most stringent criteria are "water supply (i) drinking, culinary, and food processing." These standards state that turbidity "may not exceed 5 NTU above natural conditions when the background turbidity is 50 NTU or less."

---

[1] *Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats.* American Fisheries Society Special Publication 19:297-323, 1991.

Table 2.19 — Turbidity Monitoring for Wrangell Ranger District for 2000 Road Construction Projects

Station I.D.	Date	Up-stream Turbidity (NTU)	Down-stream Turbidity (NTU)	QW Criteria Exceeded? [1]	Construction Type	Site Conditions (24 hr ppt)	Time Following Construction[2]
Zarembo 6590/ MP 27.9	6/25	0.33	2.49	no	Culvert replacement	Light rain	67 hours
Zarembo 6590/ MP 29.77	6/23	0.39	4.51	no	Culvert replacement	No rain	49 hours
Zarembo 6590/ MP 29.599	6/23	0.46	3.21	no	Culvert replacement	No rain	47.5 hours
Wrangell 50034/ MP 1.368	3/20	0.44	23.0	yes	New road construction	Moderate rain (0.52")	65 hours
Wrangell 50034/ MP 1.368	3/22	0.69	8.53	yes	New road construction	Heavy rain (1.46")	90 hours
Wrangell 50034/ MP 1.368	3/24	0.73	20.8	yes	New road construction	Heavy rain (.94")	138 hours
Wrangell 50034/ MP 1.368	3/26	1.0	5.04	no	New road construction	Heavy rain (1.74")	186 hours
Wrangell 50034/ MP 1.381	3/24	0.73	1.20	no	New road construction	Heavy rain (.94")	42 hours
Wrangell 50034/ MP 1.393	3/24	0.73	4.60	no	New road construction	Heavy rain (.94")	42 hours
Wrangell 50034/ MP 1.393	3/26	1.00	3.13	no	New road construction	Heavy rain (1.74")	90 hours
Wrangell 50034/ MP 1.398	3/24	0.73	>1000	yes	New road construction	Heavy rain (.94")	42 hours
Wrangell 50034/ MP 1.398	3/26	1.0	45.6	yes	New road construction	V. Heavy rain (1.74")	90 hours
Wrangell 50034/ MP 1.398	3/28	0.52	>1000	yes	New road construction	Rain (0.44")	138 hours
Wrangell 50034/ MP 1.398	3/30	0.49	>1000	yes	New road construction	Heavy rain (1.07")	186 hours
Wrangell 50034/ MP 1.398	4/4	0.43	18.2	yes	New road construction	Rain (0.54")	306 hours

[1]/ Turbidity exceedances for either *"water supply (i)" and "aquatic life"* criteria; however, none of the streams are actually being used as domestic water supplies.

[2]/ Hours listed are hours following culvert installation; however, at some sites road construction and haul continued through the monitoring period.

Table 2.20 — Turbidity Monitoring for Petersburg Ranger District for 2000 Road Construction Projects

Station I.D.	Date	Up-stream Turbidity (NTU).	Down-stream Turbidity (NTU)	QW Criteria Exceeded? [1]	Construction Type	Site Conditions (24 hr ppt)	Time Following Construction [2]
Kupreanof 45803-4/ 8+85	10/30	0.18	0.17	no	New culvert	Light rain	49 hours
Kupreanof 45803-2/ 62+46	9/27	0.20	0.22	no	New culvert	Dry, low flows	47.5 hours
Kupreanof 45803-2/ 60+06	9/26	0.28	0.24	no	New culvert	Dry, low flow	48 hours
Kupreanof 45803-2/ 26+95	8/22	1.01	1.13	no	New culvert	Heavy rain (2.81")	49 hours
Kupreanof 45803-2/ 15+30	8/12	0.53	0.63	no	New culvert	Dry	50 hours
Kuiu 6415 MP 2.84	6/30	0.51	0.99	no	Culvert replacement	No rain, moderate flow	44 hours

[1]/ Turbidity exceedances for either *"water supply (i)" and "aquatic life"* criteria, however, none of the streams are actually being used as domestic water supplies.

[2]/ Hours listed are hours following culvert installation; however; at some sites road construction and haul continued through the monitoring period.

Table 2.21 — Turbidity Monitoring for Revillagigedo Island, Hoonah and Prince of Wales Island 2000 Road Construction Projects

Station I.D.	Date	Up-stream Turbidity (NTU)	Down-stream Turbidity (NTU)	QW Standard Exceeded? [1]	Construction Type	Site Conditions (24 hr ppt)	Time Following Construction [2]
Shoal Cove 8444 MP 2.15	6/29	0.57	0.62	no	Culvert replacement	Light rain	1.5 hours
Shelter Cove 8330 MP 3.12	6/8	0.46	0.68	no	Culvert replacement	Low flow	24 hours
Shelter Cove 8330 MP 3.22	6/7	0.33	1.02	no	Culvert replacement	Very Low flow	24 hours
Shelter Cove 8340 MP 2.38	5/30	0.59	2.13	no	Culvert replacement	Low flow	89.25 hours after culvert installation; 2 hours after rip-rap placement
Shelter Cove 8340 MP 1.04	5/31	0.38	12.2	yes	Culvert replacement	Low flow	2.5 hours
Shelter Cove 8340 MP 1.04	6/1	0.43	4.88	no	Culvert replacement	Low flow	21.5 hours
Shelter Cove 8330 site 3	6/5	0.29	5.60	yes	Culvert replacement	Low flow	3 hours
Shelter Cove 8330 site 3	6/5	0.35	2.87	no	Culvert replacement	Low flow	24 hours
Indian Ck Hollis 2016251 7+01	10/23	0.80	0.97	no	New Culvert	Rain	66 hours
8 Fathom (HRD) 8580 MP 1.49	6/28	0.68	0.59	no	Culvert replacement	Low flow	41.8 hours
8 Fathom 8580 MP 2.02	6/29	0.57	0.96	no	Culvert replacement	Low flow	42.75 hours
8 Fathom 8580 MP 2.035	6/30	1.49	1.48	no	Culvert replacement	Low flow	41.8 hours
8 Fathom 8580 MP 2.112	7/1	0.15	2.89	no	Culvert replacement	Low flow	41.5 hours
8 Fathom 8580 MP 2.22	7/9	0.67	2.54	no	Culvert replacement	Low flow	42 hours

Station I.D.	Date	Up-stream Turbidity (NTU)	Down-stream Turbidity (NTU)	QW Standard Exceeded? [1]	Construction Type	Site Conditions (24 hr ppt)	Time Following Construction [2]
8 Fathom 8580 MP 3.30	7/7	0.74	0.59	no	Culvert replacement	Low flow Light rain	41.5 hours
8 Fathom 8580 MP 11.2	7/8	0.25	1.26	no	Culvert replacement	Low flow	41.5 hours
8 Fathom 8582 MP 1.49	7/10	0.52	1.65	no	Culvert replacement	Low flow	42 hours

[1]/ Turbidity exceedances for either *"water supply (i)" and "aquatic life"* criteria; however, none of the streams are actually being used as domestic water supplies.

[2]/ Hours listed are hours following culvert installation; however, at some sites road construction and haul continued through the monitoring period.

Data reported in Tables 2.19, 2.20, and 2.21 represent turbidity monitoring results for a cross-section of road construction projects scattered across the Tongass. Most of the data was collected within a 48-hour period following instream excavation to install individual road drainage structures. The Wrangell Island data, however, includes results for drainage structures installed on four channels of an alluvial fan crossing sampled at one to eleven day intervals between March 20 and April 4, 2000 in the Turn Creek watershed. The Shoal Cove and Shelter Cove data were collected shortly after construction in an effort to identify any affects to turbidity occurring within the 1.5 – 3 hours following construction.

Water quality criteria for turbidity were met at all sites with the exception of the Wrangell Island sites. Turbidity measurements collected downstream from road construction activities at all Kupreanof, Kuiu, Prince of Wales, and Chichagof Island monitoring locations were at or only slightly above upstream (background) turbidity levels. Significantly higher turbidity levels were observed at the Wrangell Island monitoring sites. Two of the four Wrangell Island sites were within limits set in the Alaska Water Quality Criteria.

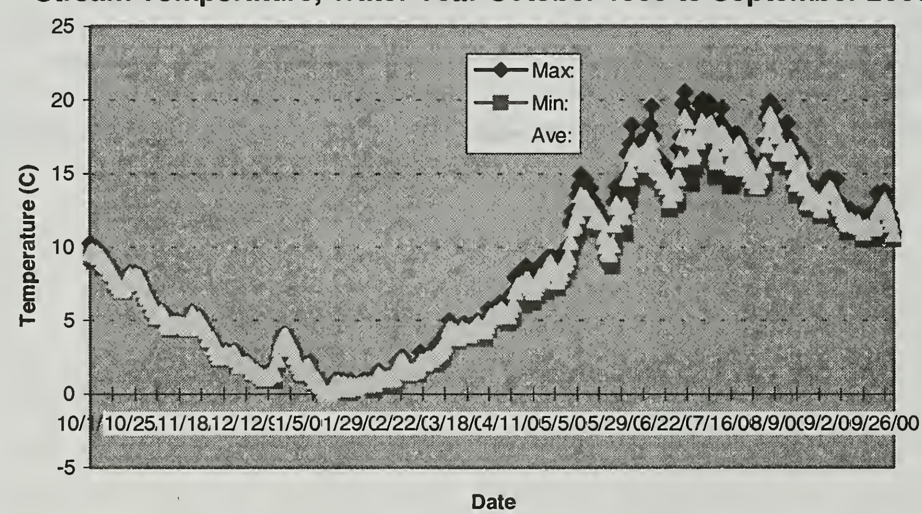
Stream Temperature

Stream temperature monitoring has been conducted for several years on a number of Tongass Ranger Districts, but without overall coordination under a formal, Tongass-wide program. Some efforts are associated with improvement project (fisheries or watershed) monitoring, but most have been in response to links in water temperatures and fish kills. As of this writing, there are 11 sites on Craig RD (five in unmanaged watersheds), three on Sitka RD, and nine on Thorne Bay RD. Only the data and results from the Thorne Bay monitoring were available for this report.

The nine Thorne Bay RD temperature monitoring sites on Prince of Wales Island are in Hatchery Creek, Luck Creek, Ratz Creek, Rio Beaver, Rio Roberts, Thorne River, Staney Creek, South Fork Staney Creek, and Shaheen Creek. All temperature monitoring sites used recording thermographs installed in deep pools within temperature-sensitive channel segments. Daily maximum, minimum, and average temperature values have been summarized for Water Year 2000 for all stations, with the exception of Staney and South Staney where data was lost due to instrument problems.

Alaska State Water Quality Standards require that maximum stream temperature not exceed 20 degrees centigrade. The preferred water temperature for salmon is 15 °C or less. Average daily summer temperatures for most Year 2000 stream temperature measurements were between 12 °C and 14 °C. The maximum temperature threshold was exceeded at only one site, Hatchery Creek. Annual temperature plots for Rio Roberts and Hatchery Creek monitoring sites are displayed in the figure below and on the following page.

Hatchery Site 1
Stream Temperature, Water Year October 1999 to September 2000

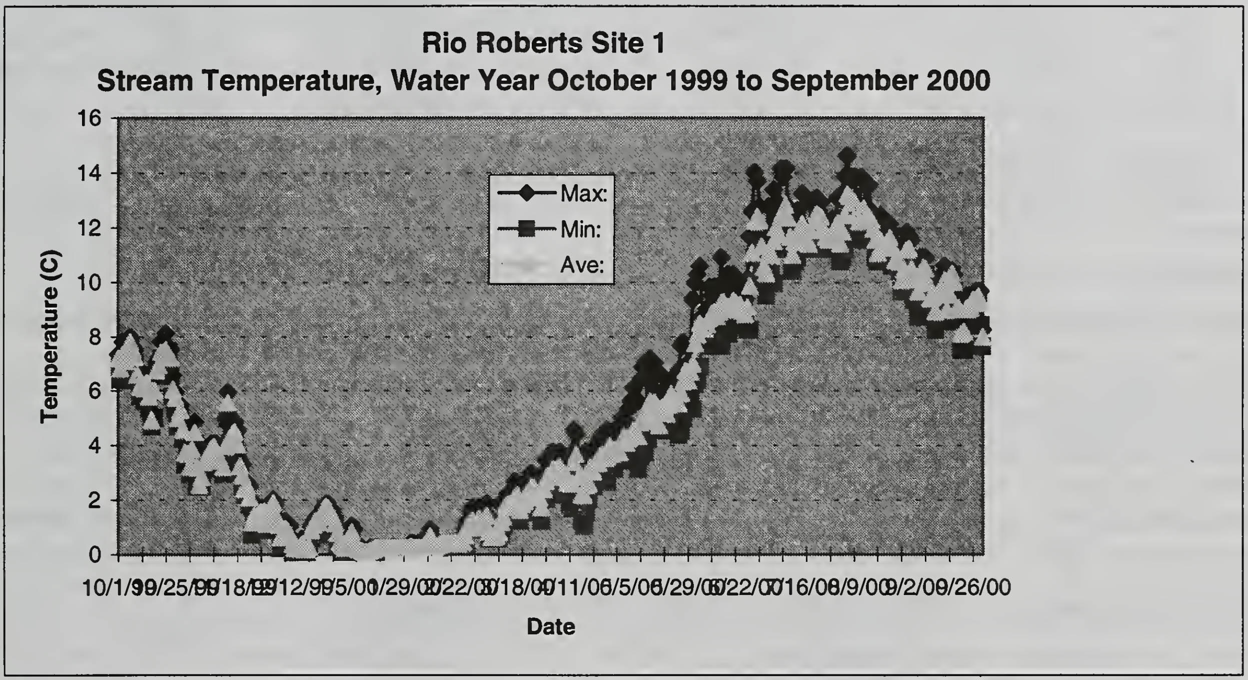


Evaluation of Results

Stream Temperature

Stream temperature monitoring by Thorne Bay District employees did not identify high temperature concerns in five of the six watersheds where reliable data were collected. The one exception, Hatchery Creek, is in a watershed with extensive lakes. The large surface area of lakes in Hatchery Creek watershed has an overriding influence on the thermal regime in this watershed. No temperature-related concerns were apparent in the other watersheds.

Previous research on stream temperature influences on fish kills (AWGFF 1991[2]) has shown that low dissolved oxygen levels associated with very low volume stream flow is the greatest factor influencing large fish kills in Southeast Alaska. Higher stream temperatures are common during summer low flow periods and do play a role in limiting the amount of dissolved oxygen present in the water column. The interrelation between low flow and stream temperature is a key aspect of the fish die-off issue that the current monitoring program cannot address.



There are several recommendations that should be implemented to improve the utility of future stream temperature monitoring data.

- Establish a formal Tongass-wide temperature monitoring program with clearly developed program goals and objectives.
- If an objective of the temperature monitoring program is to determine influences of riparian stand age and structure on summer stream temperature regimes, streams with large lake influences are not good sites for addressing this objective, and should be dropped from the program.
- Characterization of riparian conditions in each sample watershed is needed. To be effective in determining the influence of streamside vegetation on temperature, the sample subset should represent a range of riparian vegetation conditions, from unmanaged old growth to extensively harvested watersheds.

---

[2] Factors Affecting Pink Salmon Pre-Spawning Mortality in Southeast Alaska, Alaska Working Group on Cooperative Forestry and Fisheries Research, Tech. Report 91-01, November 1991.

- There is a need to incorporate summer low-flow discharge measurements into the monitoring program in order to evaluate the key influence of dissolved oxygen deficits on fish die-off risk. Intermittent stream discharge measurements taken during July-August low-flow periods at identified temperature monitoring sites/station should be correlated to continuous stream flow measurements collected at the Staney Creek USGS stream gage. A low-flow recurrence interval can then be determined for periods of elevated stream temperature.
- Recent analysis of long-term stream flow information indicates decadonal climatic cycles have a significant influence on the frequency and duration of low-flow events on POW watersheds (personal communication, Ed Neal, U.S. Geological Survey, July 28, 2000). This finding highlights the need for long-term data to detect and discuss the influence of climatic cycles on the fish die-off issue.

Stream Turbidity

Reviewing the turbidity data, the turbidity levels at 26 of the 28 sites met the criteria of the State Water Quality Standards for water supply in accordance with the 48-hour variance period. Two of these sites, located near Shoal Cove, that were measured a couple of hours after in-stream construction showed turbidity levels that initially exceeded the standards. These two Shoal Cove sites were re-measured and showed compliance with the State Standards within the 48-hour variance period. Road construction related monitoring identified water quality concerns at two Wrangell sites. In some cases, these sites were monitored through active road construction as well as following construction. These sites exceeded turbidity criteria for State Water Quality Standards. The following corrective measures were implemented at this road construction project (Turn Timber Sale) in an effort to mitigate erosion problems:

- Added cross drains to control runoff through a rock quarry.
- Installed silt-fencing and sediment detention ponds in small stream, which was receiving the quarry runoff.
- Installed geo-fabric along portions of the road to stabilize sub-grade.

Unfortunately, these mitigation measures were not successful in reducing sediment delivery to acceptable levels in the Turn Creek tributaries. Potential effects on aquatic biota in Turn Creek are unknown. Turbidity problems observed in Turn Creek tributaries resulted from a number of factors, including a road alignment that paralleled a small headwater stream; road alignment that drained long distances of road toward the alluvial fan; rainfall during the construction period (12 inches in 17 days); poor quality quarry rock that rapidly broke down with truck haul traffic; and delays in implementing corrective actions. The following adaptive management recommendations should be implemented in future projects where similar site conditions exist (for example, marginal rock sources and construction during high rainfall periods):

- Design rock quarries to minimize potential sediment delivery to streams.
- Erosion control plans should be reinforced in road contract provisions (erosion control structures and materials installed with initial road pioneering).
- Under extreme conditions (when erosion control measures are ineffective), consult with Line Officer, Forest Staff, and ADEC representatives to determine if temporary shut-down provisions in the road contract should be invoked.

Stream Protection Measures at Road Crossings

Results of an interagency IDT review of culvert replacement and maintenance projects (to improve fish passage) are discussed elsewhere in this report. However, several observations and recommendations from the culvert-fish review are also relevant to the water quality effectiveness question.

The IDT reviewed approximately 25 culvert replacement sites on Northeast Chichagof Island near Hoonah. Design standards for fish passage were fully implemented at the majority of these sites. However, concerns with excessive streambed erosion and scour during the replacement process were noted by the road contract inspector. The IDT also observed extensive channel head-cutting upstream from some culverts installed last year.

The channel head-cutting problem was linked to inappropriate design standards being applied to fish culverts on streams with gradients over 3 percent. These basic design standards have been modified since these culverts were installed. The current "stream simulation" culvert design approach should eliminate channel head-cutting problems in future installations, and meet objectives for fish passage and stream protection as well. The IDT recommended additional mitigation measures that should be considered to limit erosion and stream sedimentation concerns in culvert replacement projects.

These recommendations include:

1. Use clean rock fill to bring streambed elevation up to the original (natural) stream grade below the culvert outlet.
2. Avoid installing culverts on streams during late spring-early summer snowmelt runoff periods. Obtaining a variance for work during low flow periods, outside the normal fish-timing window, should not be a major issue for small streams where little or no summer spawning activity occurs.
3. Use of sediment control structures (e.g., temporary rock dikes, silt fences) may be appropriate at sites where extensive excavation is required for culvert placement.
4. Upstream channel grade control structures should be considered for culvert placement on moderate grade streams (3 to 6 percent).
5. Use of buried culvert inverts is a critical element in fish passage designs. Therefore, stream crossing site surveys should determine depth to bedrock for fish culvert designs in valley foot slope streams (MM, MC, HC stream process groups).

Overall results from Year 2000 water quality monitoring indicate that in most cases application of Best Management Practices have been generally effective in meeting State Water Quality Criteria for turbidity and temperature and in accomplishing Forest Plan objectives for water quality protection. The additional practices recommended above should help to improved performance for the unusual situations where implementation of existing BMP's was not fully successful in meeting water quality goals.

References

DeGayner, E.J, D.C. Crocker-Bedford, and D. Aho. A Reassessment of Management Indicator Species for the Tongass National Forest. Forest Service, Alaska Region, Juneau, AK.

Gier, J.G., Landwehr, D.J., Grundy, M,B., Tisler, T., Oien, J., and A. Grundy. 2000. Mechanics Friving Landslide Occurrence in the Margaret Lake Basin (1995-1999). Tongass National Forest, Ketchikan-Misty Ranger District, Unpublished doc., 36p.

Iverson G. C. 1997. Analysis of Revised TLMP Old-Growth Habitat Reserves and VPOP HCAs. TLMP Revision Planning File, unpublished report. 25pp.

Iverson, G., C. Crocker-Bedford, E.J. DeGayner, T. Schenck and L. Suring. 1998. Administrative study information needs assessment. USDA Forest Service, Alaska Region, Juneau, AK.

Iverson, G.C., G.D. Hayward, K. Titus, E. DeGayner, R.E. Lowell, D.C. Crocker-Bedford, P.F. Schempf and J. Lindell. 1996. Conservation assessment for the northern goshawk in Southeast Alaska. USDA Forest Service Gen. Tech. Rep. PNW-GTR-387, Juneau, AK.

Landwehr, Dennis J. 1994. The Use of Low Elevation Oblique Aerial Photographs to Monitor Soil Quality Standards on Extremely Steep Slopes. Ketchikan Area Watershed Group. Unpublished Monitoring Report. October 1994.

Landwehr, Dennis J. 1997. Soil Disturbance on the 89-94 FEIS Long-term Sale Area - Compilation of Reports. Internal document.

Landwehr, Dennis J. 1998. The Effectiveness of Standards and Guidelines in Preventing Additional Mass Movement. An 89-94 KPC FEIS Monitoring Report. Ketchikan Area Watershed Group. February 1998.

Landwehr, Dennis J.; and Nowacki, G. 1999. Statistical Review of Soil Disturbance Transect Data Collected on the Ketchikan Area, Tongass National Forest. Internal Document. February 1999.

Landwehr, Dennis J. 1999. Inventory and Analysis of Landslides Associated with 89-94 KPC LTS Units and Roads On the Thorne Bay Ranger District. Ketchikan Area Watershed Group. February 1999.

Mulder, B.S., B.R. Noon, T.A. Spies, M.G. Raphael, A.R. Olsen, C.J. Palmer, G.H. Reeves, and H.H. Hart. 1997. *The Strategy and Design of the Effectiveness Monitoring Program for the Northwest Forest Plan*. Final Report of the Effectiveness Monitoring Team for the Northwest Forest Plan. Intergovernmental Advisory Committee. USDA Forest Service, Pacific Northwest Research Station, Portland, OR.

Noon, B.R., T.A., Spies, and M.G. Rapheal. 1997. *Conceptual Basis for Designing an Effectiveness Monitoring Program*. Final Report of the Effectiveness Monitoring Team for the Northwest Forest Plan. Intergovernmental Advisory Committee. USDA Forest Service, Pacific Northwest Research Station, Portland, OR.

Swanston, D.N., Shaw, C.G., Smith W.P., Julin, K.R, Cellier, G.A., Everest, F.H. 1996. Scientific information and the Tongass Land Management Plan: key findings derived from the scientific literature, species assessments, resource analyses, workshops, and risk assessment panels. USDA Forest Service, Gen. Tech. Rep. PNW-GTR-386, Juneau, AK.

USDA Forest Service. 1982. National Forest System land and resource management planning, Code of Federal Regulations 36, Sec. 219.19, on fish and wildlife planning. *Fed. Register* 47(190): 43026-43052.

USDA Forest Service. 1989. Ketchikan Pulp Company Long-term Sale Area Final Environmental Impact Statement for the 1989-94 Operating Period. R10-MB-66a. et al. USDA Forest Service, Alaska Region, Juneau Alaska.

USDA Forest Service. 1997. Land and Resource Management Plan. Tongass National Forest. USDA Forest Service, Alaska Region, R10-MB-338dd. Juneau, AK.

USDA Forest Service. 1997. Todahl Backline Timber Harvest, FEIS Environmental Assessment. USDA Forest Service, Tongass National Forest, Juneau. R10-MB-351.

USDA-Forest Service 1997. Tongass Land and Resource Management Plan. USDA Forest Service, Alaska Region, Juneau. R10-MB-338.

USDA-Forest Service 1998. Canal Hoya Timber Sale, FEIS. USDA Forest Service, Tongass National Forest, Juneau. R10-MB-363.

USDA-Forest Service 1998. Control Lake Timber Sale, Record of Decision. USDA Forest Service, Tongass National Forest, Juneau. R10-MB-369c.

USDA-Forest Service 1998. Crystal Creek Timber Harvest, Record of Decision and FEIS. USDA Forest Service, Tongass National Forest, Juneau. R10-MB-364.

USDA-Forest Service 1998. Chasina Timber Sale, FEIS Record of Decision, USDA Forest Service, Tongass National Forest, Juneau. R10-MB-365c.

USDA-Forest Service 1998. Nemo Loop Timber Sale, Environmental Assessment, Decision Notice, and Finding of No Significant Impact. USDA Forest Service, Tongass National Forest, Juneau. R10-MB-361a.

USDA-Forest Service 1998. Niblack Lakes and Streams Forest Plan Amendment EA . USDA Forest Service, Tongass National Forest, Ketchikan.

SUBSISTENCE

Goal: Provide for, "...the continuation of the opportunity for subsistence uses by rural residents of Alaska..." (Public Law 96-487—DEC. 2, 1980, Sec.801)

Objectives: Evaluate and consider the needs of subsistence users in making project land management decisions.

Implement the subsistence monitoring report template that was developed last fiscal year. The template was designed to organize and display monitoring information in order to facilitate an in-depth description of the effects of management activities on subsistence users.

Background: The Alaska National Interest Lands Conservation Act (ANILCA, 1980) requires a priority for subsistence uses by rural residents on Federal public land in Alaska (Title VIII). Since 1990, the Federal Government has been managing resources for subsistence use on Federal public lands through the Federal Subsistence Board.

Several pieces of legislation and sets of regulations provide the framework of our legal responsibilities. These are:

Title VIII of ANILCA;

Federal Subsistence Management Regulations (36 CFR 242 or 50 CFR 100);

Federal Advisory Committee Act (FACA); and

Federal Advisory Committee Management Regulations (41 CFR 101-6).

Current Situation: In 1995, the Ninth Circuit Court of Appeals ruled that the existing scope of the subsistence program should be expanded to include"...those navigable waters in which the United States has an interest by the virtue of the reserved water rights doctrine." Subsistence management of these waters became effective in October 1999.

To date, this new responsibility has resulted in the development of investigative projects designed to evaluate the condition of fish stocks important to subsistence fisheries, gather and evaluate Traditional Ecological Knowledge (TEK) in several key subsistence areas, and evaluate the consistency of the various existing fish harvest regulations. In addition to working through another annual cycle of wildlife regulation proposals, the first cycle of subsistence fishing regulation proposals were evaluated and presented to the Southeast Regional Advisory Council.

Subsistence Question: Are the effects of management activities on subsistence users in rural Southeast Alaska communities consistent with those estimates in the Forest Plan?

Monitoring Results

The known effects of management activities on subsistence users (rural residents as defined in ANILCA) have not been determined to be inconsistent with the Forest Plan.

Many of the monitoring projects are long term in nature, and conclusions will not be available for several more years.

The following is the Subsistence Monitoring Report template that has been designed to organize and display monitoring information in order to facilitate an in-depth description of the effects of management activities on subsistence users.

SUBSISTENCE MONITORING REPORT TEMPLATE

I. Communications, Consultations, and Contacts.

Scoping/Collaborative Stewardship summary.

1. NEPA Scoping – Subsistence portions.

A total of 71 NEPA documents were signed in fiscal year 2000. For each of these projects, the effects on subsistence resources were analyzed and a subsistence determination was made. These projects ranged in complexity from environmental impact statements (EIS) on major timber sales to Decision Memos for small scale Special Use Permitted projects.

2. Communications with community leaders regarding subsistence issues.

   Currently we have no standardized way of keeping track of communications with community leaders and Federally recognized Tribes concerning subsistence matters. Because of this, it is hard to differentiate between contacts made with community leaders and recognized Tribes. For this reason, the discussions for item number 2 and 3 are combined under number 3.

3. Consultations with Federally recognized Tribes regarding subsistence issues.

   Consultations with Tribes and communications with community leaders took place in many forms. These included informal meetings, informal public open houses, formal 810 hearings, national Roadless Area meetings, Fish and Game Advisory Board meetings, other organized group board meetings, and teleconferences. There were at least 72 meetings between Forest Service representatives and members of the public that resulted in discussions concerning subsistence issues.

   These meetings generally fall into the following groups: proposed hunting or fishing regulation changes, subsistence fishery investigative studies, proposed timber sale impacts and mitigation, other project impacts, repatriation of cultural artifacts, and work on large planning projects. Some of these large planning projects include the Salmon Enhancement Board in Yakutat, transportation planning in Yakutat and Hoonah, MOU with the Kootznoowoo Corporation in Angoon, Katliane Watershed Assessment, national roadless public hearings, and “Common Grounds” meetings in Craig.

4. Efforts to capture traditional environmental knowledge, such as Dog Point Camp.

   There were several cultural camps throughout the Tongass National Forest this fiscal year. The Forest Service was not a major participant in any of these camps this season.

5. Comments from Native and non-Native groups regarding subsistence issues.

   Issues that where brought out during scoping efforts include maintaining road access to subsistence resources, concern over population health of fish and wildlife stocks, competition for natural resources between rural and non-rural harvesters, issues related to design and dedication of interpretive signs at Anan Creek, and repatriation of cultural artifacts.

II. Subsistence 810 Hearings, Studies, TRUCS, and Regional Advisory Council Meeting Summaries.

Subsistence 810 Hearing(s) Summary.

1. Number of hearings, dates, locations, number of participants, and project association.
   Two 810 hearings were held on the Tongass National Forest this fiscal year. One was held in Wrangell on January 5, 2000 concerning the Skipping Cow Timber Sale. Five members of the public attended this meeting. The other hearing was held in Wrangell on April 27, 2000 concerning a separate timber sale planning effort. No one from the public attended this meeting.

2. Subsistence issues raised at the hearings.
   The main issue brought up in the Skipping Cow Timber Sale meeting was the desire to maintain road access to subsistence resources as well as to investigate the opportunities to increase road access.

Administrative study summary.
See Section IV.A.4, for information on new administrative studies.

TRUCS updates and summaries.
New data will be available over the next few years. New TRUCS maps and analysis will be completed when the new data is collected.

Regional Advisory Council (RAC).

1. Summary of RAC Annual Report.
   Annual report is available from the Forest Subsistence Coordinator.

2. Summary of Federal Subsistence Board response to RAC Annual Report.
   This summary is available from the Forest Subsistence Coordinator.

III. Alaska Department of Fish and Game (ADF&G) and Other State Agency Data Summaries.

Wildlife Harvest Data Summary.
Harvest data and summaries are available from ADF&G.

Fish Harvest Data Summary.

1. Commercial fish.
   Harvest data and summaries are available from ADF&G.

2. Sport fish.
   Harvest data and summaries are available from ADF&G.

Division of Subsistence Data Summary.
Data summaries are available from ADF&G.

Department of Labor Census Data.
The census data for 2000 is not yet available.

IV. USDA Forest Service Data Summary.

District/Office Data Summary.

A series of new projects were initiated in fiscal year 2000. These projects are being conducted in cooperation with ADF&G, local individuals, community governments, and Tribal governments. The two attached tables summarize these new studies.

Several other data collection efforts are ongoing and are in various stages of analysis. Information concerning these data sets can be obtained from the appropriate Forest Service office. These data sets include: Tongass deer jawbone/teeth age data, Tongass leg bone/fat analysis data, Tongass deer pellet count mortality data, Petersburg Ranger District marten study, Petersburg Ranger District deer study, Petersburg Ranger District wolf study, and Thorne Bay Ranger District Heceta Island deer study.

Table 2.22 Tongass National Forest Wildlife Subsistence Contracts as of October, 2000

Project Title	Status	Contract Action	ADF&G FY2000	Tribes/Locals FY2000
Traditional Ecological Knowledge Summary for the Community of Angoon	Work in Progress	Contract Awarded to Robi Craig	$0.00	$10,000.00
Prince of Wales Island Deer Use and Values	Work in Progress	Contract Awarded to ADF&G, Division of Subsistence	$46,500.00	$0.00
Analysis of Yakutat Subsistence Harvest and Use	Work in Progress	Contract Awarded to ADF&G, Division of Subsistence	$16,600.00	$0.00
Compile Subsistence Use and Harvest Data for the Community of Angoon	Work in Progress	Contract Awarded to the Yakutat Native Association	$0.00	$43,100.00

Table 2.23

FIS PROJECT NUMBER/ FSB APPROVAL	PROJECT TITLE	STATUS	CONTRACT ACTION	FY2000 ADFG	FY2001 ADFG	FY2002 ADFG	FY2000 TRIBES/ LOCALS	FY2001 TRIBES/ LOCALS	FY2002 TRIBES/ LOCALS	FY2000 USFS	FY2001 USFS	FY2002 USFS	INVESTIGATION PLAN	PRE-PROPOSAL
	Regulation Review	FSB approval waived	Contract with THCC(~60K)	$0	$0	$0	$60,000	$0	$0	$0	$0	$0		
	Hetta Lake Sockeye Salmon Assessment	Investigation plan being developed	Sikes Act and tribal contract awarded	$46,914	$0	$0	$24,792	$24,792	$24,792	$0	$0	$0		
14 / 1/14/00	SE AK Escapement Database	On hold pending more discussions with ADFG	May require a Sikes Act contract	$10,000	$0	$0	$0	$0	$0	$0	$0	$0		
15 / 1/14/00	SE AK Subsistence GIS Project	Investigation plan completed	Sikes Act contract completed	$48,137	$0	$0	$0	$0	$0	$0	$0	$0	GIS Fisheries IP	
43 / 5/4/00	Klawock Lake Sockeye Salmon Stock Assessment	Investigation plan completed	Sikes Act and tribal contract awarded	$158,241	$0	$0	$29,900	$31,000	$31,000	$0	$0	$0	Klawock Lake IP	Klawock Lake PP
44 / 5/4/00	Fall lake Sockeye Salmon Stock Assessment	Investigation plan completed	Sikes Act and tribal contract awarded	$118,400	$0	$0	$8,200	$42,000	$42,000	$6,000	$0	$0	Fall Lake IP	Falls lake PP
45 / 5/4/00	Traditional Subsistence Territory Mapping of SE AK Native Tribes	Draft investigation plan completed	Contract with Juneau Forestry Sciences Lab (150k)	$10,000	$10,000	$10,000	$140,000	$0	$0	$30,000	$30,000	$30,000		

Timber Management

Timber Management Question 1: Are timber harvest activities adhering to applicable timber management standards and guidelines?

Goal: Maintain and protect multiple use values and resources in harvest areas.

Objective: Determine whether standards and guidelines are being followed in harvest areas.

Monitoring Question: Are timber harvest activities adhering to applicable timber management standards and guidelines?

Timber Management Question 1 addresses the limitation of created openings greater than 100 acres and the 1,000-foot beach and estuary buffer requirement. All harvest unit locations are entered in the Forest's geographic information system (GIS). These units are compared to the 1,000-foot beach and estuary buffers to determine if they infringe on the buffer zones. In addition, unit size is tracked (see Timber Management Question 6).

Refer to the Fish Habitat, Karst and Caves, Soil and Water, Wetlands, and Transportation sections in this report for a discussion of harvest as related to standards and guidelines for those resources.

Monitoring Results:

There were 5,923 acres fully or partially harvested during fiscal year 2000. Of these, 4,593 acres resulted in the creation of an opening. The majority of the harvests accomplished were sold under the 1979 TLMP. The 100-acre size limitation applies to all harvest units. Four created openings exceeded 100 acres in size. One unit was on the Petersburg District (420-45), two units were on the Craig District (613-107 and 613-254), and one was on the Ketchikan-Misty District (BC6031). All of these were analyzed and approved in the project-level Records of Decision.

Table 2.24 — Category 1 Units Exceeding 100 Acres in Size

District	Compartment	Stand	Unit	Unit Acres	NEPA Document
Petersburg	42002	203	420-45	102	North and East Kuiu EIS
	42102	14	420-45	4	North and East Kuiu EIS
				106	North and East Kuiu EIS
Craig	61303	509	613-107	121	Polk Inlet EIS
	61303	512	613-254	101	Polk Inlet EIS
Ketchikan-Misty	73601	49	BC6031	77	North Revilla EIS
	73602	49	BC6031	40	North Revilla EIS
				117	

There were 18 stands harvested during FY 2000 that fell partially or completely within the 1,000-foot beach and estuary zone. All of these harvests were from Category 1 sales that did not need to be modified as a result of the 1997 TLMP Revision and its 1,000-foot beach and estuary standard and guideline. The stands that fell within the buffer were located on five ranger districts (see Table 2.25).

Table 2.25 — Category 1 Units Partially or Completely Within the Beach/Estuary Buffer

District	Compartment	Stand	Unit	Unit Acres	Acres in Buffer
Petersburg	39900	54	16	60	36
	44200	112	536	27	1
Petersburg Total				87	37
Wrangell	46200	255	3	35	11
	46200	256	4	24	5
Wrangell Total				59	16
Craig	61304	500	613-127	36	3
	61802	508	618-106	29	28
	61802	509	618-107	32	22
	62102	509	621-264	39	2
Craig Total				136	55
Ketchikan-Misty	73602	76	BC6002	37	9
	73602	84	BC6028	32	21
	73602	81	BC6029	46	9
	73304	54	HSK3021	55	2
	73305	70	HSK3023H	44	2
	73502	51	HSK5038W	25	3
	73504	57	HSK5501H	13	10
	73504	59	HSK5525	40	1
Ketchikan-Misty Total				322	57
Thorne Bay	56203	22	27	25	8
	58711	111	587-212B	9	1
Thorne Bay Total				34	9

Evaluation of Results:

No action is needed. The timber harvest activities discussed above are adhering to applicable timber management standards and guidelines.

Timber Management Question 2: Are harvested forested lands restocked within five years following harvest?

Goal: Forest productivity is to be maintained in all harvest areas. Monitor the restocking of all lands that have received a regeneration harvest and determine if restocking has occurred within five years of final harvest.

Objective: Areas not adequately restocked with desirable tree cover within a five-year time frame are to be identified and action taken to see that failed areas are reforested. Changes in silviculture practices may be necessary in these areas.

Background: Obtaining regeneration that meets the stocking guidelines and certification standards identified in the Silvicultural Practices Handbook (FSH 2409.17) is rarely a problem on stands receiving a regeneration harvest on the Tongass National Forest. Unpublished research and field observations indicate there are specific site conditions and opportunities that may indicate a need for artificial regeneration (this is usually planting and only rarely artificial seeding). Some situations to be particularly aware of are as follows:

- Alluvial sites;
- cutover, open canopy, or sparsely stocked sites with an established ground cover of dense vegetation such as salmonberry, devils club, or grass;
- sites lacking a satisfactory seed source within approximately 660 feet from the center of the cutting unit;
- sites with lower productivity that presently have a plurality of cedar and in which there is a desire to retain a cedar component in the stand;
- stand compositions where change is needed, such as stands planned for harvest or already harvested where the adjacent seed source contains a high incidence of fluted hemlock;
- artificial regeneration is rarely needed and is prescribed on less than 5 percent of the harvested acres; and
- stands needing reforestation for other considerations, such as visually sensitive areas in which immediate regeneration through artificial reforestation would lessen the visual impact; or using genetically improved stock to increase the genetic makeup of the treated stand.

Monitoring Question: Are harvested forested lands restocked within five years following harvest?

All harvested lands are examined following treatment. Artificially seeded or planted areas are examined one and three years after treatment. Examination occurs three growing seasons after treatment in areas where it is anticipated that natural regeneration will be adequate. Stands are certified as stocked if the third growing season survey indicates that the areas meet stocking standards. Artificial regeneration is prescribed if the third-year survey indicates that natural regeneration is highly unlikely. A silviculturist recommends Regeneration Certification for every unit harvested that meets or exceeds the stocking guidelines in the Silvicultural Practices Handbook - FSH 2409.17. Certification records are reported through the District Ranger to the Forest Supervisor. Certification records are kept in stand files at the ranger districts and in the Silvicultural Information System (SIS), an electronic database.

During fiscal year 2000, 3,298 acres were examined to determine the condition of the regeneration in harvest areas. Based on SIS data, timber harvest that occurred in fiscal years 1991 through 1995 was evaluated, as displayed on the following pages.

<u>**Monitoring Results**</u>

1991 Harvests

In last year's monitoring report (R10-MB-414), we identified 57 acres harvested during fiscal year 1991 that remained uncertified. These acres were located on the Hoonah Ranger District in one stand. The stand was examined during fiscal year 2000 and certified as restocked.

Table 2.26 — Status of Reforestation after Final Harvest FY 1991

Tongass Unit	Final Harvest Reported in FY 1991	Adequately Stocked Acres	% Adequately Stocked Acres	Acres Not Adequately Stocked	% Not Adequately Stocked
Petersburg RD	1,360	1,360	100	0	0
Wrangell RD	751	751	100	0	0
Sitka RD	562	562	100	0	0
Hoonah RD	1,435	1,435	100	0	0
Juneau RD	868	868	100	0	0
Craig RD	496	496	100	0	0
Ketchikan-Misty RD	360	360	100	0	0
Thorne Bay RD	4,568	4,568	100	0	0
Total	10,400	10,400	100	0	0

1992 Harvests

In last year's monitoring report we identified 83 acres harvested during fiscal year 1992 that remained uncertified. Thirteen acres were in one stand on the Hoonah Ranger District. The remaining 70 acres were located in one stand on the Wrangell Ranger District. These stands were examined during fiscal year 2000 and certified as restocked.

Table 2.27 — Status of Reforestation after Final Harvest FY 1992

Tongass Unit	Final Harvest Reported in FY 1992	Adequately Stocked Acres	% Adequately Stocked Acres	Acres Not Adequately Stocked	% Not Adequately Stocked
Petersburg RD	1,767	1,767	100	0	0
Wrangell RD	1,034	1034	100	0	0
Sitka RD	900	900	100	0	0
Hoonah RD	2,013	2,013	100	0	0
Juneau RD	406	406	100	0	0
Yakutat RD	450	450	100	0	0
Craig RD	281	281	100	0	0
Ketchikan-Misty RD	639	639	100	0	0
Thorne Bay RD	4,721	4,721	100	0	0
Total	12,211	12,211	100	0	0

1993 Harvests

In last year's monitoring report we identified 41 acres harvested during fiscal year 1993 that remained uncertified. These acres were located on the Hoonah Ranger District in two stands. These stands were examined during fiscal year 2000 and certified as restocked.

Table 2.28 — Status of Reforestation after Final Harvest FY 1993

Tongass Unit	Final Harvest Reported in FY 1993	Adequately Stocked Acres	% Adequately Stocked Acres	Acres Not Adequately Stocked	% Not Adequately Stocked
Petersburg RD	1,880	1,880	100	0	0
Wrangell RD	936	936	100	0	0
Sitka RD	807	807	100	0	0
Hoonah RD	1,827	1,827	100	0	0
Craig RD	1,447	1,447	100	0	0
Ketchikan-Misty RD	414	414	100	0	0
Thorne Bay RD	3,807	3,807	100	0	0
Tongass NF Total	11,118	11,118	100	0	0

1994 Harvests

In last year's monitoring report we identified 81 acres harvested during fiscal year 1994 that remained uncertified. Of these, 34 acres were in one stand on the Hoonah Ranger District. The remaining 47 acres were located in two stands on the Wrangell Ranger District. These stands were examined during fiscal year 2000 and certified as restocked.

Table 2.29 — Status of Reforestation after Final Harvest FY 1994

Tongass Unit	Final Harvest Reported in FY 1994	Adequately Stocked Acres	% Adequately Stocked Acres	Acres Not Adequately Stocked	% Not Adequately Stocked
Petersburg RD	908	908	100	0	0
Wrangell RD	2,358	2,358	100	0	0
Sitka RD	1,285	1,285	100	0	0
Hoonah RD	890	890	100	0	0
Craig RD	420	420	100	0	0
Ketchikan-Misty RD	817	817	100	0	0
Thorne Bay RD	3,366	3,366	100	0	0
Tongass NF Total	10,044	10,044	100	0	0

1995 Harvests

All stands harvested in 1995 were certified as restocked with the exception of one stand on the Thorne Bay Ranger District. Stand 104, a nine-acre stand in Compartment 59401, was on National Forest land when harvested in 1995. The area in which the stand is located was subsequently conveyed to other ownership. Figures displayed in the table above for Thorne Bay District reflect the conveyance and nine-acre reduction.

Table 2.30 — Status of Reforestation after Final Harvest FY 1995

Tongass Unit	Final Harvest Reported in FY 1995	Adequately Stocked Acres	% Adequately Stocked Acres	Acres Not Adequately Stocked	% Not Adequately Stocked
Wrangell RD	938	938	100	0	0
Sitka RD	674	674	100	0	0
Hoonah RD	333	333	100	0	0
Craig RD	1,523	1523	100	0	0
Ketchikan-Misty RD	1,677	1677	100	0	0
Thorne Bay RD	2,752	2752	100	0	0
Total	7,897	7897	100	0	0

Evaluation of Results:

The results show that an adequate percentage of the acres of harvested forestlands were restocked within five years following harvest.

Timber Management Question 3: Is the Allowable Sale Quantity (ASQ) consistent with resource information and programmed harvest?

The Tongass National Forest operated during fiscal years 1998 and 1999 under the May 1997 Forest Plan ROD. The 1997 ROD set the allowable sale quantity (ASQ) at 267 million board feet (MMBF) per year. The April 1999 Modified Forest Plan ROD revised the ASQ to 187 MMBF per year. The transition to the lower ASQ was established in the 1999 Modified Forest Plan to be implemented beginning October 1, 1999, the start of fiscal year 2000 (TLMP ROD, April 1999, Section VII. Implementation, pgs. 63, 64).

The ASQ is an upper ceiling governing the amount of timber that may be sold over a decade. The amount of sold timber may vary year to year but must not exceed the decadal ceiling. Timber is considered sold when the contract is awarded to the high bidder. The table below displays the amount of timber sold during fiscal years 1997 through 2000, and compares the total to the average annual amount of the ASQ.

Table 2.31 — Tongass National Forest Timber Sold By Fiscal Year

Fiscal Year	Timber Volume Sold (Percent of ASQ)	Average Annual ASQ (1997 and 1999 TLMP ROD)
1997	111 MMBF (42% of ASQ)	267 MMBF
1998	24 MMBF (9% of ASQ)	267 MMBF
1999	61 MMBF* (23% of ASQ)	267 MMBF
2000	170 MMBF** (91% of ASQ)	187 MMBF***
Average	91.5 MMBF	

*This figure does not include timber sales that were advertised and had bid openings in fiscal year 1999 but were awarded in fiscal year 2000.
**This figure includes sales advertised and had bid openings in fiscal year 1999 but were awarded in fiscal year 2000. This was due to financial review of a purchaser prior to timber sale award.
***Note the change in ASQ due to the transition and implementation of the Record of Decision for the 1999 Modified Forest Plan.

The measure of the ASQ is the timber volume sold, not the amount advertised or harvested per year. Timber sales sold during one year are typically harvested over several years. Included in the table below are harvest totals for the Tongass National Forest for fiscal years 1990 through 2000 for comparison purposes only.

Table 2.32 — Tongass National Forest Timber Harvest By Fiscal Year

Fiscal Year	Harvest Total (Million Board Feet)	Forest Plan Allowable Sale Quantity	Percent of ASQ Harvested*
1990	471	450	1.05
1991	363	450	81
1992	370	450	82
1993	325	450	72
1994	276	450	61
1995	221	450	49
1996	120	450	27
1997	107	267	40
1998	112	267	42
1999	146	267	55
2000	147	187	79
4 Year Average (since Forest Plan Revision in 1997)	128		

*Shown for illustrative purposes only; the measure of the ASQ is based on timber harvest volume "sold" on a decadal average basis.

The timber tables display that current timber harvest and timber sold levels are not at or near the 1997 and/or the 1999 Forest Plan ASQ ceilings. The effects of timber harvest are below the amount analyzed in the 1997 TLMP FEIS and/or the 1997 and 1999 TLMP FEIS Records of Decision. Therefore, with implementation of land use designation prescriptions, Forest Plan standards and guidelines, and Best Management Practices, the ASQ is consistent with resource information and programmed timber harvest.

Evaluation of Results

No action necessary at this time.

Timber Management Question 4: Are the Non-Interchangeable Components (NIC) of the allowable sale quantity (ASQ) consistent with actual harvest?

The ASQ consists of two separate non-interchangeable components (NIC). Under the 1999 Modified Forest Plan, the ASQ is divided into NIC I (set at 1.53 billion board feet of timber per decade) and NIC II (set at .34 billion board feet per decade). The economic components of the ASQ equate to an average of 153 million board feet NIC I and 34 million board feet NIC II per year.

The Forest Plan sets the proportional mix of timber harvest volume for the NIC I and NIC II categories. The proportional mix in the Modified Forest Plan is set at approximately 80 percent NIC I and 20 percent NIC II (1999 TLMP FEIS ROD, pgs 12, 13). This represents a higher reliance on the NIC II component than that found in the 1979 Forest Plan.

The purpose of partitioning the ASQ into two separate components is to maintain the economic sustainability of the timber resource by preventing over-harvest of the most economic timber stands. The partitioning of the ASQ also serves to identify that portion of the timber supply that is at risk of attainment because of marginal economic conditions. The NIC I component includes land that can be harvested using normal economic logging systems (normal being defined as standard logging systems such as shovel and short span cable). The NIC II component includes land with high logging costs that are typically economically and technologically marginal. The NIC II component includes difficult and isolated operable timber stands requiring special logging equipment requirements due to yarding distances or topography (such as the use of long-span cable, multi-span cable and helicopter).

Theoretically, the NIC II component of the ASQ would only be offered for sale after the NIC I component had been satisfied. The sale of timber from NIC II lands would most likely be offered when the commodity market for timber is relatively high and the higher operational costs could be covered by the fiber value. Realistically, this is not the only case and the Forest Service typically offers some portion of NIC II with the total timber sale package. There are a variety of reasons for the inclusion of NIC II lands in timber sales including silvicultural treatments and the economics of mobilization.

Monitoring Results

All timber sale harvest units that were completed during fiscal year 2000 were categorized into non-interchangeable components (NIC) using the Forest plan operability layer in the geographic information system (GIS).

Total timber volume harvested on the Tongass in fiscal year 2000 was approximately 147 million board feet.

Table 2.33 — Comparison of NIC I and NIC II Harvest By Fiscal Year, Based on Percent of Total Harvest

Fiscal Year	NIC I Percent of Harvest	NIC II Percent of Harvest
1997*	No Data Collected	No Data Collected
1998	95 percent	5 percent (estimated)
1999	88 percent	12 percent
2000	77 percent	23 percent

*The 1997 Forest Plan Monitoring and Evaluation Report did not analyze the NIC I and NIC II timber harvest categories.

The Modified Forest Plan ROD states that the ratio of the NIC I and NIC II mix is approximately 80 percent NIC I and 20 percent NIC II (Final EIS, Table 3-81, page 3-282; and 1999 ROD page 13). The mix of NIC I and NIC II for fiscal year 2000 as displayed above is 77 percent NIC I and 23 percent NIC II.

Although the NIC data has only been monitored for two years (and estimated one year), an upward trend is apparent in the proportion of the NIC II lands harvest component. Using the approved NEPA document reasons for prescribing helicopter harvest, several broad categories have been formed to roughly estimate an increase observed in the helicopter logging system category. There are several possible reasons why the NIC II component could be trending upward:

- The increased use of helicopter logging to access hard-to-road, unstable soil/steep topography areas (47 percent);
- The increased use of helicopter logging to meet scenic quality objectives (40 percent); and
- The increased use of helicopter logging to meet the general objective of leaving structure for wildlife and to meet the general objective of using less clearcut timber harvest prescriptions (13 percent).

The harvest units used for this analysis are those harvest units that had logging completed and accepted by the Forest Service during fiscal year 2000. This sample includes 14 percent of post TLMP Record of Decision NEPA approved timber harvest units. (It should be noted that the harvest units approved prior to the 1997 TLMP ROD were designed to meet the standards and guidelines from the draft TLMP in 1996. Also, approximately 11 percent of the harvest unit sample used some type of two-aged management prescription.) The trend toward an increasing NIC II proportion may continue as the Forest implements more timber NEPA decisions in accordance with the 1999 TLMP ROD.

Evaluation of Results

No action is necessary at this time. Continue to monitor the trend of harvest from NIC II lands.

Timber Management Question 5: Is the proportional mix of volume in NIC I and NIC II accurate, as estimated in the Forest Plan?

The 1999 Modified Forest Plan set the ASQ ceiling at 1.87 billion board feet per decade, equivalent to an annual average of 187 million board feet per year. The two separate components were proportioned at 1.53 billion board feet of NIC I and 0.34 billion board feet of NIC II per decade or 153 MMBF NIC I and 34 MMBF of NIC II per year.

The non-interchangeable components (NIC) are based on logging operability. Operability refers to logging systems operability, a determination of logging system requirements for different areas of suitable lands. Logging systems are selected based on resource protection needs, access limitations, and economics. The information used in the Forest Plan to estimate and set the proportional mix of components was derived from the logging operability inventory. All normal operability lands provide the NIC I portion of the ASQ, and the difficult and isolated lands make up the NIC II portion.

Monitoring Results

The non-interchangeable components (NIC I and NIC II) of the timber areas harvested this year were compared to the TLMP Operability GIS layer for each NIC category. The following table displays the results of that comparison.

Table 2.34 — Comparison of the Proportional Harvest of NIC I and NIC II Using TLMP GIS Data to Actual Implemented Harvest Units

	NIC I	NIC II
TLMP Planned	82%	18%
Implemented in fiscal year 2000	77%	23%

It is too early to distinguish if the proportional mix of non-interchangeable components is estimated accurately. Not enough data has been collected and analyzed to date to make this determination. As stated in Timber Management Question 4, there seems to be an upward trend in the proportion of NIC II lands harvested. This trend may be partly due to resource protection needs, and addressing this mitigation through helicopter and not using other cable systems that may be capable of achieving the same objectives. The timber commodity market has been improving since the low Pacific Rim market experienced in 1998. Timber under contract was held and not harvested during the low market period in speculation of market improvement. In fiscal year 2000, purchasers may have harvested timber sale contracts that approached contract termination dates (those unexecuted in the 1998 low market). The Ketchikan Pulp Company Long Term Sale Contract ended and accounted for approximately 60 to 65 percent of the helicopter harvest on the Forest in fiscal year 2000.

Evaluation of Results

No action is necessary at this time; continue to monitor the proportional mix of harvest from NIC II category lands.

Timber Management Question 6: Should maximum size limits for harvested areas be continued?

Goal: Maintain multiple-use values as effected by opening size.

Objective: Determine whether or not a recommendation to change the maximum harvest opening size should be made. Monitor the multiple-use effects of harvest opening size on the Forest.

Background: The 1976 National Forest Management Act (NFMA) regulations established 100 acres as the maximum size for created openings using the even-aged system (clearcutting, seed tree, and shelterwood) within the western-hemlock, Sitka spruce forest type of coastal Alaska. The Forest Supervisor, under certain conditions, can approve created openings of up to 150 acres. The Regional Forester can approve openings up to 200 acres. Factors to consider, when approving openings greater then 100 acres, are provided in the Forest Plan's Forest-wide standards and guidelines for the timber resource. There appears to be no need to pursue change in the maximum opening size or the factors for approving openings greater than 100 acres.

Monitoring Results:

During fiscal year 2000, 181 harvest areas (timber stands) were delineated in the Forest's geographic information system (GIS), with corresponding records created in the Forest's Silviculture Information System (SIS) database. Accounting for adjacency (harvested stands that touch one another, which create a larger opening when added together), 130 harvest areas were logged in fiscal year 2000 that created openings using the even-aged silvicultural system. The table below displays the frequency of openings created through timber harvest during fiscal year 2000.

Table 2.35 — Harvest Unit Frequency by Unit Size

Acreage Range	Number of Openings	Total Number of Acres
1-10	17	103
11-20	26	386
21-30	19	479
31-40	20	705
41-50	20	889
51-60	13	732
61-70	3	190
71-80	4	301
81-90	2	170
91-100	2	193
101-110	2	207
111-120	1	117
121-130	1	121
Totals	130	4,593

Evaluation of Results

Four of the created openings exceeded 100 acres in size. The 130 openings averaged 35 acres, and ranged from 1 to 121 acres in size. Trends in harvest opening size have been toward smaller openings and less reliance on the even-aged silvicultural system. Forest Plan standards and guidelines for scenery and sensitive species such as Northern goshawk and American marten, and soil and water BMPs emphasize smaller sizes. Also, emphasis on leaving old-growth structure in harvest areas is resulting in smaller harvest openings.

In addition to the 130 units discussed above, 33 units were harvested using either uneven-aged or two-aged systems or were salvage harvested. Totaling 1,330 acres, these harvest units ranged in size from 1 acre to 214 acres. The system name is based on the number of age classes present after the initial harvest, such as even-aged, two-aged, and uneven-aged. Even-aged systems produce stands that consist of trees of the same or nearly the same age. Two-aged stands result from treatments which leave behind a substantial portion of the original stand structure in the form of large trees distributed or clumped throughout the stand area. The remnant trees left on the site represent one age class, and the newly established trees represent another age class. Finally, uneven-aged systems create stands that include three or more distinctly different age classes by using individual or group selection methods.

Transportation

Goal: Develop and manage roads and utility systems to support resource management; recognize the potential for future development of major transportation and utility systems.

Objectives: Provide access for Forest users and support Forest resource management activities. Manage and maintain roads to protect water, soil, fish, and wildlife resources.

Transportation Question: Are the standards and guidelines used for forest development roads and log transfer facilities effective in limiting the environmental effects to anticipated levels?

Access and Travel Management

The TLMP Monitoring and Evaluation Guidebook (May 1999 draft) directs that gates and barriers on closed roads should be visually inspected for integrity and evidence of being bypassed. In fiscal year 2000, information was collected on the existence and effectiveness of roadway features installed to block access to highway vehicles on all roads surveyed under the Region 10 Road Condition Survey Protocols.

The data presented below is not intended to represent conditions across the Tongass National Forest. It is simply a listing of the blockage features and their effectiveness found in the FY 2000 surveys and collected for this year. Data from previous surveys were collected using different protocols. As the rest of the road systems are surveyed using the new protocols, a more complete picture of the effectiveness of road blockage features will be available.

Monitoring Results

Two types of blockage features were evaluated for effectiveness: pits dug across the road, with the material from the pit mounded in front of the pit; and removed bridges. Pits were excavated at locations of removed culverts and near the beginning of roads to block traffic. Locations of mounds and pits and removed bridges were recorded, and visually checked for evidence of traffic driving past them. The data was recorded on both classified roads (Forest development roads) and unclassified roads (temporary roads). Classified roads are constructed and maintained for long-term use, while unclassified roads are constructed for temporary access and short-term use.

The blockage feature most often identified during the evaluation was the mound and pit. Effective mound-and-pit blockages were encountered 253 times on classified roads and 794 times on unclassified roads. Ineffective mound-and-pit blockages were found 74 times on classified roads and 216 times on unclassified roads. Removed bridges effectively blocked traffic at each of the 24 sites on classified roads and at each of the six sites on unclassified roads. Removed culverts were used on five classified roads.

Evaluation of Results

The monitoring results indicated that bridge removal is an effective method of blocking vehicle traffic, with 100 percent of the surveyed sites showing no evidence of traffic. The mound-and-pit technique was not quite as successful. Blocking vehicle traffic by mound and pit on classified roads was successful at 77 percent of the sites, and at 79 percent of the sites on unclassified roads. This may be due to the use of water bars, which are shallow mounds and pits commonly used to divert water off unclassified roads. Another consideration is that while the intent was to discourage public passenger vehicular traffic, access was desired for resource-oriented fieldwork using off road vehicles. More success in blocking traffic at these sites can be gained by excavating deeper trenches.

Stream Turbidity

Monitoring of stream turbidity during in-stream activity involves a simple, low-cost observation of a water quality standard responding to routine effectiveness monitoring commitments in the USDA Forest Service Memorandum of Agreement with the Alaska Department of Environmental Conservation (1992).

The basis of the turbidity sampling procedure is to determine if Best Management Practices are effective in preventing water quality degradation (using turbidity as the sole parameter of water quality). According

to the Alaska Forest Resources and Practices Regulations (11AAC95), "degradation of water quality" means a decrease in water quality such that the affected waters are unable to fully maintain existing or designated uses, but does not include decreases in water quality that are temporary, localized, and reparable. 11AAC95 defines "temporary" as 48 hours or less and "reparable" as an effect that is reversible by natural processes, such that the designated use will return to a state functionally identical to the original.

The Monitoring and Evaluation Guidebook provides the turbidity sampling procedures. The Interagency Monitoring and Evaluation Group (including representatives from the Environmental Protection Agency and the Alaska Department of Environmental Conservation) developed these procedures with an underlying assumption that the evaluation criteria for turbidity would be based on the beneficial use of water for "growth and propagation of fish, shellfish, other aquatic life, and wildlife." The Alaska Water Quality Standards (18AAC70, as amended through May 27, 1999) require that, with respect to this "aquatic life" designated beneficial use, turbidity levels may not exceed 25 NTU (nephelometric turbidity units) above natural conditions; for all lake waters, the levels may not exceed 5 NTU above natural conditions. However, the Alaska Water Quality Standards actually require that the most stringent criteria for water quality apply to streams unless a variance to change the designated use is granted. The most stringent criterion is "water supply (i) drinking, culinary, and food processing." These standards state that turbidity "may not exceed 5 NTU above natural conditions when the turbidity is 50 NTU or less, and may not have more than 10 percent increase in turbidity when the natural turbidity is more than 50 NTU, not to exceed a maximum increase of 25 NTU."

Turbidity measurements taken at stream crossings during construction activities indicate that the State water quality standard for "water supply (i)" was achieved at 26 of 28 sites monitored. The standard for "aquatic life" was achieved at 27 sites. The Best Management Practices (BMPs) employed at these sites are effective in preventing water quality degradation of the turbidity parameter when evaluated for the existing use of both "aquatic life" and "water supply" criteria. No changes in BMPs are recommended. Additional monitoring data would be useful to further validate that the BMPs are effective in preventing water quality degradation of the turbidity parameter when evaluated for the designated use of "water supply (i)." The Guidebook was modified to reflect that correct evaluation criterion for turbidity is the "water supply (i)" standard of 5 NTU since last year's report.

Monitoring Results

Turbidity was measured at four stream crossings installed on the Turn Timber Sale Road (Road 50034) on Wrangell Island and three sites on Zarembo Island. Also measured were five stream crossings on Kupreanof (Road 45803) and one culvert installed this season on Kuiu Island (Road 6415). Eight culvert replacements on the Eight Fathom Road System (8580) on Hoonah Ranger District, seven culvert installations at Shelter Cove, one culvert installation on Shoal Cove Road (84000), and one culvert installation at Indian Creek Road (2016251) were also monitored. The tables that follow display construction type, site conditions, and in-channel turbidity readings for each sample site. Also shown is any departure from the strictest State water quality standard.

Table 2.36 — Turbidity Monitoring for Wrangell Ranger District for 2000 Road Construction Projects

Station I.D.	Date	Up-stream Turbidity (NTU)	Down-stream Turbidity (NTU)	QW Criteria Exceeded? [1]	Construction Type	Site Conditions (24 hr ppt)	Time Following Construction [2]
Zarembo 6590/ MP 27.9	6/25	0.33	2.49	no	Culvert replacement	Light rain	67 hours
Zarembo 6590/ MP 29.77	6/23	0.39	4.51	no	Culvert replacement	No rain	49 hours
Zarembo 6590/ MP 29.599	6/23	0.46	3.21	no	Culvert replacement	No rain	47.5 hours
Wrangell 50034/ MP 1.368	3/20	0.44	23.0	yes	New road construction	Moderate rain (0.52")	65 hours
Wrangell 50034/ MP 1.368	3/22	0.69	8.53	yes	New road construction	Heavy rain (1.46")	90 hours
Wrangell 50034/ MP 1.368	3/24	0.73	20.8	yes	New road construction	Heavy rain (.94")	138 hours
Wrangell 50034/ MP 1.368	3/26	1.0	5.04	no	New road construction	Heavy rain (1.74")	186 hours
Wrangell 50034/ MP 1.381	3/24	0.73	1.20	no	New road construction	Heavy rain (.94")	42 hours
Wrangell 50034/ MP 1.393	3/24	0.73	4.60	no	New road construction	Heavy rain (.94")	42 hours
Wrangell 50034/ MP 1.393	3/26	1.00	3.13	no	New road construction	Heavy rain (1.74")	90 hours
Wrangell 50034/ MP 1.398	3/24	0.73	>1000	yes	New road construction	Heavy rain (.94")	42 hours
Wrangell 50034/ MP 1.398	3/26	1.0	45.6	yes	New road construction	V. Heavy rain (1.74")	90 hours
Wrangell 50034/ MP 1.398	3/28	0.52	>1000	yes	New road construction	Rain (0.44")	138 hours
Wrangell 50034/ MP 1.398	3/30	0.49	>1000	yes	New road construction	Heavy rain (1.07")	186 hours
Wrangell 50034/ MP 1.398	4/4	0.43	18.2	yes	New road construction	Rain (0.54")	306 hours

[1]/ Turbidity exceedances for either *"water supply (i)" and "aquatic life"* criteria; however, none of the streams are actually being used as domestic water supplies.

[2]/ Hours listed are hours following culvert installation; however, at some sites road construction and haul continued through the monitoring period.

Table 2.37 — Turbidity Monitoring for Petersburg Ranger District for 2000 Road Construction Projects

Station I.D.	Date	Up-stream. Turbidity (NTU).	Down-stream Turbidity (NTU)	QW Criteria Exceeded? [1]	Construction Type	Site Conditions (24 hr ppt)	Time Following Construction[2]
Kupreanof 45803-4/ 8+85	10/30	0.18	0.17	no	New culvert	Light rain	49 hours
Kupreanof 45803-2/ 62+46	9/27	0.20	0.22	no	New culvert	Dry, low flows	47.5 hours
Kupreanof 45803-2/ 60+06	9/26	0.28	0.24	no	New culvert	Dry, low flow	48 hours
Kupreanof 45803-2/ 26+95	8/22	1.01	1.13	no	New culvert	Heavy rain (2.81")	49 hours
Kupreanof 45803-2/ 15+30	8/12	0.53	0.63	no	New culvert	Dry	50 hours
Kuiu 6415 MP 2.84	6/30	0.51	0.99	no	Culvert replacement	No rain, moderate flow	44 hours

[1]/ Turbidity exceedances for either *"water supply (i)" and "aquatic life"* criteria; however, none of the streams are actually being used as domestic water supplies.

[2]/ Hours listed are hours following culvert installation; however, at some sites road construction and haul continued through the monitoring period.

Table 2.38 — Turbidity Monitoring for Revillagigo Island, Hoonah, and Prince of Wales Island 2000 Road Construction Projects

Station I.D.	Date	Up-stream Turbidity (NTU)	Down-stream Turbidity (NTU)	QW Standard Exceeded?[1]	Construction Type	Site Conditions (24 hr ppt)	Time Following Construction[2]
Shoal Cove 8444 MP 2.15	6/29	0.57	0.62	no	Culvert replacement	Light rain	1.5 hours
Shelter Cove 8330 MP 3.12	6/8	0.46	0.68	no	Culvert replacement	Low flow	24 hours
Shelter Cove 8330 MP 3.22	6/7	0.33	1.02	no	Culvert replacement	Very Low flow	24 hours
Shelter Cove 8340 MP 2.38	5/30	0.59	2.13	no	Culvert replacement	Low flow	89.25 hours after culvert installation; 2 hours after rip-rap placement
Shelter Cove 8340 MP 1.04	5/31	0.38	12.2	yes	Culvert replacement	Low flow	2.5 hours
Shelter Cove 8340 MP 1.04	6/1	0.43	4.88	no	Culvert replacement	Low flow	21.5 hours
Shelter Cove 8330 site 3	6/5	0.29	5.60	yes	Culvert replacement	Low flow	3 hours
Shelter Cove 8330 site 3	6/5	0.35	2.87	no	Culvert replacement	Low flow	24 hours
Indian Ck Hollis 2016251 7+01	10/23	0.80	0.97	no	New Culvert	Rain	66 hours
8 Fathom (HRD) 8580 MP 1.49	6/28	0.68	0.59	no	Culvert replacement	Low flow	41.8 hours
8 Fathom 8580 MP 2.02	6/29	0.57	0.96	no	Culvert replacement	Low flow	42.75 hours
8 Fathom 8580 MP 2.035	6/30	1.49	1.48	no	Culvert replacement	Low flow	41.8 hours
8 Fathom 8580 MP 2.112	7/1	0.15	2.89	no	Culvert replacement	Low flow	41.5 hours

Station I.D.	Date	Up-stream Turbidity (NTU)	Down-stream Turbidity (NTU)	QW Standard Exceeded?[1]	Construction Type	Site Conditions (24 hr ppt)	Time Following Construction[2]
8 Fathom 8580 MP 2.22	7/9	0.67	2.54	no	Culvert replacement	Low flow	42 hours
8 Fathom 8580 MP 3.30	7/7	0.74	0.59	no	Culvert replacement	Low flow Light rain	41.5 hours
8 Fathom 8580 MP 11.2	7/8	0.25	1.26	no	Culvert replacement	Low flow	41.5 hours
8 Fathom 8582 MP 1.49	7/10	0.52	1.65	no	Culvert replacement	Low flow	42 hours

[1]/ Turbidity exceedances for either *"water supply (i)" and "aquatic life"* criteria; however, none of the streams are actually being used as domestic water supplies.

[2]/ Hours listed are hours following culvert installation; however, at some sites road construction and haul continued through the monitoring period.

Table 2.39 — Turbidity Corrective Action/Mitigation Measures. Wrangell Ranger District: Turn Creek Roads

Road Number	Culvert Station	Details on Departure From 48-Hour Degradation Criteria	Corrective Action/ Mitigation Measures Taken
50034	MP 1.368 MP 1.381 MP 1.393 MP 1.398	Aquatic life criteria exceeded for at least nine days in Turn Creek or tributaries (resident fish streams). Few of the corrective measures were effective in reducing turbidity. Declining precipitation and reduced rock haul seemed to be the most effective in reducing turbidity. See Turn Timber Sale Road Construction Turbidity Report for details.	Install a cross drain upslope (southwest) of the quarry to control road runoff entering the quarry. Install silt fencing between the road and Quarry Creek to reduce the amount of sediment entering Quarry Creek. A settling pond was excavated at the inlet of the Quarry Creek culvert. Excavate a pond for sediment detention near the origin of Quarry Creek to intercept the sludge plume before it enters the stream. Sturdy geo-fabric was placed along the road surface on the west side of the fan, then covered with rock in an attempt to improve the competency of the prism and maintain a crown.

In all cases, turbidity samples were measured as aliquots of water samples collected upstream of disturbance and within 20 feet downstream of the culvert outlet. A Hach 2100P Portable Turbidimeter was used to measure turbidity at the site immediately after the water sample was obtained. Downstream turbidity levels were within 5 NTU of upstream at all but two of the Wrangell Island sites.

Water quality criteria for turbidity were met at all sites with the exception of two of the Wrangell Island sites. Turbidity measurements collected downstream from road construction activities at all Revillago Island, Zarembo Island, Kupreanof, Kuiu, Prince of Wales, and Chichagof Island monitoring locations were at or only slightly above upstream (background) turbidity levels. Significantly higher turbidity levels were observed at two of the Wrangell Island monitoring sites. The Wrangell turbidity monitoring was conducted on two roads – one site on Zarembo Island and other sites at Turn Creek tributary crossings on Wrangell Island.

Evaluation of Results

The State water quality standard for "water supply (i)" was achieved at 26 of 28 sites monitored. These results indicate that the Forest is generally complying with the State water quality standards during culvert construction. Two of the Shoal Cove sites measured shortly after construction initially showed values that exceeded the State water standard criteria; however, these sites showed compliance within the 48-hour variance period. These sites did not exceed the criteria for turbidity for beneficial use for aquatic life at any time. The watersheds of these streams were not used for drinking water supply.

At two Wrangell sites, water quality problems were found to be related to road construction and haul. The sites where the standard was exceeded were both on one road construction project, Road 50034 on the Turn Timber Sale, and occurred during one incident over the course of at least nine days. Turbidity at these sites does not appear to be directly related to drainage installation or road construction techniques. The primary cause was breakdown of poor quality granite road material by truck traffic, resulting in sediment being delivered to stream courses; this was compounded by heavy rainfall (12" in 17 days). Other contributing factors were runoff from rock quarry onto roadway and ditch, and delays in implementing corrective measures, including failure to suspend rock haul during extreme sedimentation/runoff periods.

Mitigation measures consisted of installing culverts, some of which would control road runoff entering quarry, and others that would intercept ditch flow and prevent it from entering the channel by diverting it to a filter belt. In order to trap sediments, workers installed silt fencing in a small stream paralleling the road, and also between Quarry Creek and the road. Workers installed geo-fabric over the running surface and placed a lift of a different rock type to stem the rapid breakdown of road surface. However, declining precipitation and reduced rock haul traffic seemed to be most effective in reducing turbidity.

Examining the results of turbidity monitoring, the turbidity levels can be directly related to the soil and rock type, precipitation, and road alignment. Sites where rock surface material had low durability or where the soil exposed in the road cutslopes, ditches and stream banks was fine silt, showed higher turbidity values. Results from the Kupreanof, Kuiu, Shoal Cove, Indian Creek-Hollis, and Eight-Fathom sites showed that course sediment such as sands were deposited more quickly in the channels and did not stay in suspension in the water; silts and organic soils, on the other hand, stayed in suspension longer. At these sites, the streams with higher gradient channels and higher flows moved the sediment faster and did not show turbidity values that exceeded the State standards.

Recommendations for future road construction situations where the State turbidity standards are exceeded include:

- Develop a strategy for mitigation action that includes criteria for implementation.
- Immediately contact Forest hydrologists, geotechnical engineers and construction engineers to request investigation and analysis of the field situation. Contact Forest Service staff and contract administration team to implement corrective action.

Log Transfer Facilities

Monitoring will continue to be conducted for each log transfer facility (LTF) under terms of the LTF permits, in accordance with Alaska water quality standards and requirements from the Environmental Protection Agency for non-point source discharge. LTF monitoring for this report was accomplished through field inspection and completion of a Log Transfer Facility Monitoring Table. This table is designed to pull together simple yes/no assessments made of the success of the Best Management Practices stipulated as terms of the LTF permits. The assessment elements of the LTF Monitoring table include the following:

Site Identification: Common Name; Corps of Engineer Permit Name, NPDES 402 Permit.

Transfer Activity: Facility Transfer Type; Activity Status; Current year volume.

Fuel Control: Visible Oil Sheen per LTF guidelines M5 of TLMP (Alaska Timber Taskforce Guidelines); Discharge Reported to Alaska Department of Environmental Conservation (ADEC) under requirements of Alaska Administrative Code (18 AAC 75.300-307); Discharge Reported to National Response Center (NRC) under requirements of the Clean Water Act (40 CFR 110,117, and 302).

Runoff Control: Reference BMP 14.27 - Drain to Sediment Trap; Vegetated Filter Strip.

Bark and Debris: Reference BMP 14.27 Excessive Churning Prevented; Remove Debris & Bark from LTF/yard; Bark & Debris Properly Disposed; Marine Bark Zone of Deposit; Date Last Dive.

Monitoring Results

Two general types of monitoring occur: upland and marine. The upland monitoring is summarized into simple yes/no assessments made by Forest Service timber sale administrators, and is recorded under the general categories of "Fuel Control", "Runoff Control", and "Bark and Debris." These assessments were made for all the active sites. Contracted divers performing underwater bark debris surveys accomplish marine monitoring.

Bark Monitoring and Reporting

Bark monitoring is required annually for each log transfer facility (LTF), under the EPA General NPDES Permit No. AK-G670-1000 and EPA General NPDES Permit No. AK-G70-0000, that transfers a total volume of 15 mmbf or more during the next five years, and is located in less than 60 feet mean lower low water (MLLW). LTFs classified as Type V or VI LTFs under Part I.B. are not required to conduct bark monitoring. If the annual bark monitoring survey conducted at the beginning of the season indicates continuous coverage by bark and wood debris of 0.9 acre or greater, the next annual bark monitoring survey shall be conducted after cessation of log transfer, or in the following year prior to any additional log transfer. Otherwise the annual bark monitoring survey is not required during years when the LTF is not operating.

The purpose of the bark monitoring program is to determine compliance with the Alaska water quality standards for settable – residues in marine waters. In accordance with 18 AAC Section 70.210, ADEC has authorized a zone of deposit for facilities authorized to discharge under this general NPDES permit, which includes the project area. The zone of deposit may include continuous coverage, discontinuous coverage, and trace coverage by bark and wood debris.

Preliminary bark monitoring dives and pre-discharge bark surveys were conducted at 34 LTFs in 2000. Only two of the LTFs, Rowan Bay and St. John Baptist, had a continuous coverage of bark and wood debris that exceeded both 1.0 acre and a thickness of 10 centimeters at any point (see Table 2.40).

Oil Sheen Monitoring and Reporting

During periods of log transfer operation, receiving waters at the LTF shall be visually monitored daily for the presence of an oil sheen. The presence of an oil sheen shall be recorded, with the date, name of observer, cause or source of oil sheen, and corrective measures taken, and shall be reported to EPA within 24 hours in accordance with Part IX.B.

Evaluation of Results

In 2000 all active log transfer facilities were operated in accordance with their permits. The cases where fuel/hydraulic fluid control was a problem were handled as anticipated in their operating plans. These actions, which are prescribed in the standards and guidelines for log transfer facilities, have been effective in limiting the environmental effects of LTF operation to anticipated levels. The guideline for locating LTF's along straits and channels proved to be effective in reducing underwater bark accumulations.

The Daily Oil Sheen Logs proved to be very useful in identifying causes of sheens and bringing about corrective actions. The logs are required by stipulation of NPDES permits in some cases and by Forest Service contract in others.

Table 2.40 — LTF Bark Monitoring Dives – FY 2000

Site Name	Common Name	Date Dive Completed in 2000	Zone of Deposit Acres	Dive Required
Anita Bay 1	Anita Bay South LTF	9/30/00	0.777	
Anita Bay 2	Anita Bay North LTF	9/30/00	0.508	
Appleton Cove 4	Appleton Cove LTF			X
Behm Canal 43	Hassler LTF	9/6/00	0.1	
Behm Canal 44	Shrimp Bay LTF	9/5/00	0	
Behm Canal 49	Klu Bay LTF	9/6/00	0.2	
Bradfield Canal 11	Hoya LTF	10/1/00	0	
Carroll Inlet 20	Shelter Cove LTF	9/8/00	0.2	
Carroll Inlet 23	Carroll Inlet LTF	9/8/00	0	
Carroll Inlet 7	Shoal Cove LTF	9/12/00	0.6	
Chatham Strait 60	Rowan Bay LTF	9/15/00	3.94	
Chatham Strait 99 & 77	Kennel Creek/Freshwater Bay			X
Cholmondeley Sound 16	Lancaster Cove LTF	9/1/00	0	
Cholmondeley Sound 28	West Arm Cholmondeley LTF	9/2/00	0	
Clarence Strait 21	Thorne Bay LTF			X
Clarence Strait 24	Coffman Cove LTF			X
Davidson Inlet 18	Marble Island East LTF			X
Davidson Inlet 8	Port Alice LTF	8/30/00	0.5	
Eastern Passage 12	Venus Cove LTF			X
El Capitan Pass 6a	El Capitan LTF			X
Ernest Sound 11	Deer Island West LTF	10/1/00	0.0021	
Ernest Sound 18	Frosty Bay LTF			
Frederick Sound 18	Portage Bay LTF	9/16/00	0.07	

Site Name	Common Name	Date Dive Completed in 2000	Zone of Deposit Acres	Dive Required
Frederick Sound 28	Thomas Bay TLF	9/16/00	0	
Frederick Sound 34	Saginaw Bay LTF			X
Icy Strait 6	Homeshore LTF			X
Kasaan Bay 51	Little Coal Bay LTF			
Kashevrof Pass 2 & 7	Whale Pass LTF	8/12/00	0.3	
Keku Strait 26	Hamilton Bay LTF	9/15/00	0.53	
Nakwasina Sound 13	Lisa LTF	9/14/00	0.13	
Neets Bay 12	South West Neets Bay LTF			X
Neets Bay 8	Fire Cove LTF			X
Peril Strait 14	False Island LTF			X
Peril Strait 21	Todd LTF			X
Peril Strait 29	Hanus Bay LTF			X
Port Frederick 29 & 45	8 Fathom LTF	9/9/00	0.263	
Port Frederick 41	Salt Lake Bay LTF	9/9/00	0.34	
Rodman Bay 2	Rodman Bay 2 LTF			
Saook Bay 1	Saook Bay LTF	9/10/00	0	
Shakan Strait 7	Calder LTF			X
Skowl Arm 16	Polk Inlet LTF	8/13/00	0.6	
St. John Baptist Bay 1	St. John Baptist LTF	9/11/00	1.32	
Stikine Strait 4	Deep Bay LTF	9/29/00	0	
Sumner Strait 15	Blind Slough LTF	9/29/00	0	
Sumner Strait 21	Cape Pole LTF			
Sumner Strait 54	Labouchere Bay LTF			X
Sumner Strait 78	Rynda LTF			X
Sumner Strait 81	St. John LTF			X
Sumner Strait 86 & 42	Woodpecker Cove LTF	9/29/00	0	
Televak Strait 17	Shelikof Island LTF			
Tenakee Inlet 20	Crab Bay LTF			X
Tenakee Inlet 21	Indian River LTF			X
Tenakee Inlet 24	Inbetween LTF			X
Tenakee Inlet 25	Corner Bay LTF			X
Thorne Arm 6	Elf Point LTF	9/12/00	0	

Site Name	Common Name	Date Dive Completed in 2000	Zone of Deposit Acres	Dive Required
Traitors Cove 8	Margaret Bay LTF	9/7/00	0.1	
Tuxekan Pass 6	Naukati LTF			X
Tuxekan Passage 2	Nichin Cove LTF			X
Tuxekan Passage 7	Winter Harbor LTF	8/14/00	0.2	
Twelve Mile Arm 1	East Twelve Mile LTF	9/2/00	0.3	
Ulloa Channel 4	Suemez/Refugio LTF			X
Wrangell Narrows 127	Tonka LTF	9/17/00	0.426	
Yakutat Bay 6	Sawmill Cove LTF			X
Zimovia Strait 101	King George LTF	9/30/00	0	
Zimovia Strait 15	Pats Creek LTF	9/30/00	0.33	

Wetlands

Goal: Minimize the destruction, loss, or degradation of wetlands and preserve and enhance wetland functions and values.

Objectives: Avoid alteration of or new construction in wetland whenever there is a practicable, environmentally preferred alternative. Implement Best Management Practices and estuary, riparian, and soil and water standards and guidelines specific to wetlands.

Background: Wetland implementation monitoring will follow established protocols for 100 percent BMP implementation monitoring. Additionally, a representative sample of harvest units and associated roads will be monitored annually using an interdisciplinary approach. Avoidance of wetlands will be monitored Tongass-wide each year, through GIS analysis.

Currently, the Tongass National Forest does not have an approved method to evaluate the effectiveness of BMPs related to impacts of management activities on wetland functions and values. Each environmental impact statement completed for projects that contain wetlands includes evaluation and finding for impacts relative to wetlands. Studies exist that are aimed at partially answering functional effectiveness questions. Some of these studies are complete and some are ongoing. No one study gives the answer to all the functional questions associated with management activities in wetlands.

Wetland Question 1: Are Wetlands standards and guidelines being implemented?

Implementation Monitoring

The information provided in Table 2.41 was gathered from project implementation of Category 3 and 4 timber sales - those timber sale projects for which the project-level NEPA was done post TLMP Revision ROD (TLMP ROD, 1997). All roads built and units harvested in FY 2000 were initiated under the management direction of the 1979 TLMP, as amended. The activities that took place in 2000 were developed to achieve consistency with the revised Forest Plan.

Table 2.41 — Total Acres of Wetlands Harvested and Miles of Road Constructed for the Tongass NF in FY 2000

Total Wetland Acres*	Wetland Acres Harvested	Total %	Wetland Acres Impacted By Road Construction**	Total %
5,709,069	0 ac.	0%	12.94 ac.	0%

* Total acres of mapped land (excluding private lands and some Wilderness areas). Data was taken from Tongass Soils GIS layer, managed stands, Silviculture information system (SIS) and roads database.
** Based on an average of a 21-foot wide road.

<u>Monitoring Results</u>

The wetland acres were determined from GIS layers defined through a computer mapping exercise that generally defined wetland areas. The wetland areas monitored through the BMP implementation monitoring were the actual on-the-ground soil types. A disparity exists between the resolution of the two monitoring efforts (GIS evaluation and BMP implementation monitoring), which is reflected in the differing results.

Analysis from the Soils GIS layer, managed stands, Silviculture information system (SIS) and roads database showed no wetlands were impacted by timber harvest this year and minimal wetland areas were impacted by new road construction this year. Little new road construction was completed in FY 2000. Implementation monitoring documented acres of wetland for only some of the wetland inclusions in the harvest units, and this data set for wetlands was not complete. Of the total wetlands on the Forest (mapped wetlands, which exclude some Wilderness areas and private lands), the wetlands impacted account for very little of the total wetlands.

With 0 percent of the total wetlands impacted by road construction and timber harvest, the Tongass NF has fulfilled the intent of the standards and guidelines during the year 2000 in avoiding wetlands were practicable and minimizing the impact to wetlands. Even with the combined effects on wetlands of activities in fiscal years 1998, 1999, and 2000, the Forest is illustrating avoidance of wetlands in its management activities.

BMP Implementation Monitoring

BMP implementation monitoring for wetlands (BMP 12.5) follows TNF Best Management Practices Implementation Monitoring Strategy (June 1999) protocols. Results from that monitoring are reported in the annual BMP Implementation Monitoring Report (see Appendix).

The Best Management Practices (BMPs) for wetland standards and guidelines were monitored on the Tongass through guidelines described in the Tongass Monitoring Strategy. The strategy was developed to provide direction for Tongass Land Management Plan implementation monitoring. The BMPs evaluated are included in the Soil and Water Conservation handbook (FSH 2509.22, October 1996).

Refer to the 2000 BMP Monitoring Report in the Appendix for details on how the monitoring was conducted, and details on the monitoring results. A summary of the findings for soil and water resources is given below.

Monitoring Results

BMP 12.5 – Wetland Protection Measures

The FY 2000 Best Management Practice implementation monitoring consisted of data collected on 227 forms (165 units and 61 road sections) that reflected 210 units and 71 road sites. Most of the road sections were culvert or bridge replacement sites, so the wetland protection BMP did not apply. Results of the 100-percent monitoring of units and roads for BMP 12.5 in fiscal year 2000 concluded that the BMP was fully implemented at all sites.

Reviewing the monitoring forms from the Best Management Practice implementation monitoring, areas of wetland were deleted from the units in the situations where units had been laid out with significant inclusions of wetland. Evaluation of the timber, wildlife benefit and wetland characteristics resulted in deletion of these wetland areas. Additional buffers were added or areas of timber were retained in some units to protect wetlands. In units where forested wetland was harvested, partial suspension measures were prescribed and implemented. Full suspension was achieved in most of the areas of forested wetland. Specific yarding systems were designed and utilized under the close supervision of the sale administrator in wetland areas. Very little to no soil disturbance was noted in the harvested wetland areas monitored.

Table 2.42 — BMPs Implemented

BMPs Applied	Number of Times BMP was Appropriate for Use	Number of Departures from Full BMP Implementation	Number of Times Corrective Action Applied
12.5	89	0	0

Evaluation of Results

The Best Management Practices are being implemented on the Tongass National Forest. The high quality work of individuals involved with site investigations, layout, unit design, environmental assessment, and contract administration has contributed to this success. Training on wetland identification and protection conducted on the Tongass as well as communication about wetland protection has increased the knowledge of sale administrators and engineers. The sale administrators actively avoided wetlands and implemented protective prescriptions on wetlands. They deleted wetland

areas, and added buffers and retention areas to protect wetlands. The logging systems were specifically designed with prescriptions for wetlands. Continued emphasis needs to be placed on identifying these wetland areas during environmental assessment and layout. In several of the older environmental assessment documents, the wetland areas were not identified on the unit and road cards nor specified by unit in the documents.

Comparing the results of wetland monitoring this year with results from previous fiscal years, the BMP was applied more frequently in fiscal year 2000. The number of units monitored was significantly higher in fiscal year 2000. Extensive training and communication on completion of implementation monitoring was completed prior to the spring 2000 field season. This contributed to an increased focus and understanding of the monitoring process as well as the Best Management Practices.

Wetland Question 2: Are Wetland standards and guidelines effective in minimizing the impacts to wetlands and their associated functions and values?

Monitoring and Evaluation of Results

During FY 2000, watershed specialists (soil scientists, ecologists, hydrologists and botanists) made some progress on establishing appropriate monitoring protocols for this TLMP monitoring question. The group decided to adopt the methodologies of three specific projects related to understanding the functions of wetlands. Two of these studies specifically look at wetland hydrology and how those functions are altered by road construction. These two studies are the Glaser study (The impacts of forestry roads on peatlands within the Tongass National Forest, Southeast Alaska, 1999) and the McGee study (Effects of forest roads on surface and subsurface flow in Southeast Alaska, 2000). The third study is the Wet-Soil Monitoring project, conducted by Dave D'Amore of the Forest Sciences Laboratory. This is essentially a validation monitoring project, which helps us understand the basic hydrologic functions of various wetland types.

Fiscal year 2001 will be devoted to expanding the Glaser study to include additional wetland types most impacted by forest road construction (for example, forested wetlands) across the Tongass. The McGee and D'Amore studies will be incorporated into the Case Study Watershed Analysis as part of the Riparian and Aquatic Synthesis monitoring protocols. Further, a wetland classification will be developed as part of the Existing Vegetation Classification project, which is funded under the umbrella of the Natural Resource Information System (NRIS). The components of the wetland effectiveness monitoring are described below and will be implemented during fiscal year 2001, pending appropriate funding levels.

Wetlands Classification

- Vegetation site data from existing plot data will be migrated into TERRA database.
- Analysis of the data will cluster community types and will be placed in appropriate hierarchical levels of the vegetation communities.
- Data gaps will be determined where field data of wetland communities are lacking. Field sampling of these types will be initiated during summer and will likely continue through fiscal year 2002.

Glaser Study

- Monitoring will concentrate on wetlands most impacted by road construction (e.g., forested wetlands).
- Use protocols developed by Glaser to determine appropriate sampling sites in representative areas across the Tongass.
- Select sites by spring of 2001.
- Install equipment by summer of 2001.
- Monitor for three to five years.

Wet-Soil Monitoring

- Monitoring will concentrate on typical hydrologic catenas within the selected watershed for the case studies.
- Use Wet-Soil protocols developed by Forestry Sciences Laboratory to determine appropriate sampling sites. The number of sites and locations of sites will be selected in conjunction with selection of the case study watersheds.

Road Interception of Ground Water Study

- Use McGee's study protocols (Oregon State University Master's Thesis) at several sites that are wetlands, starting with a forested wetland site as top priority, within the case study watershed.
- Number and locations of sites will be selected when the case study is initiated.

Wild and Scenic River

Goal: Maintain the outstandingly remarkable values and the free flowing conditions of rivers designated or recommended for designation as components of the National Wild and Scenic Rivers System.

Objectives: Manage all rivers recommended for designation as Wild, Scenic, or Recreational rivers in the Tongass Land and Resource Management Plan to maintain their eligibility pending designation by Congress into the National Wild and Scenic Rivers System.

Background: The Wild and Scenic Rivers Act of 1968 established a policy for preserving selected rivers in a free-flowing condition that would balance the development of water, power, and other resources on rivers of the United States. Rivers are eligible to be considered for inclusion in the National Wild and Scenic Rivers System if they are essentially free flowing (without major dams, diversions, or channel modifications) and if they possess at least one "outstandingly remarkable" scenic, recreational, geologic, fish, wildlife, historic, cultural, or other similar value. These values should be a unique or exceptional representation for the area.

Wild and Scenic River Question 1: Are Wild, Scenic, and Recreational River standards and guidelines being implemented?

The standards and guidelines are being implemented for the free flowing conditions and outstandingly remarkable values for eligible rivers on the Tongass National Forest.

Monitoring activities in 2000 to support these findings include:

1) Monitoring visitor use at several recreation sites within the corridor of seven rivers. The recommended river systems reviewed were Anan Creek, Blind River, Essowah Lakes and Streams, Hasselborg River, Katzehin River, Kegan Lake and Stream, and King Salmon River.
2) Monitoring outfitter/guide use in a number of locations.
3) Monitoring compliance of a recreation project within the corridor– reconstruction of Man-made Hole Picnic Area.
4) Analyzing effects of proposed timber harvest on outstandingly remarkable values and Wild and Scenic River standards and guidelines. The effects to Blind River from proposed timber harvest in the Woodpecker Project Area were analyzed in 1999. In 2000, this analysis was done for other proposed timber harvest projects in areas near recommended Wild and Scenic Rivers. These projects include Fanshaw, Douglas, and Overlook.

<u>**Monitoring Results**</u>

Existing use on the Hasselborg, King Salmon and Katzehim Rivers managed by the Juneau Ranger District and Admiralty National Monument appear to be within the allowed standards and guidelines for recreational outstandingly remarkable features and they appear effective in managing the rivers. This is based primarily on anecdotal evidence, reviews of outfitter/guide actual use records and very limited direct monitoring.

Specific visitor data at the recreation sites along Blind River managed by the Petersburg Ranger District was not collected as consistently during FY 2000 as in the past due to lack of personnel. Recreation maintenance crews and campground hosts did observe trends, however. As in years past, Blind River Rapids Trail and Blind Slough Picnic Area had high use during times of good weather and strong fish runs. The whole river corridor is inventoried as being Roaded Natural in the Recreation Opportunity Spectrum classification. The guidelines for social encounters in this type of area includes meeting less than 20 other parties per day on trails and in dispersed areas during at least 80 percent of the primary use season. This condition is being met at Blind River Rapids trail area. Blind Slough Picnic Area is considered a developed recreation site where it is acceptable to meet numerous other parties. The guidelines also state that developed sites are often at full capacity but do not exceed 80 percent of the design capacity over the season of operation. This condition is being met at Blind Slough Picnic Area. This river has only been recommended recently by the Forest Plan; no data exists to quantify trends to date.

One outfitter/guide is currently permitted to take sightseers to Blind River Rapids trail and other sites along the road system on Mitkof Island. The guide visited Blind River Rapids trail 65 times with a total of 661 clients. Also, in 2000, a person was permitted to operate a small concession stand at Blind River Rapids parking lot, Blind Slough Picnic Area, and Manmade Hole Picnic Area. Both of these uses are compatible with standards and guidelines for Recreational River.

A picnic area at Man-made Hole is on the edge of the Blind River corridor. The NEPA planning for the Man-made Hole Picnic Area reconstruction project on Blind River documented compliance with the Recreational River standards and guidelines. The survey and design for the project also complies with the standards and guidelines for Recreational River. Implementation for the reconstruction is planned for the summer of 2001.

No effects to Blind River were anticipated from the proposed timber harvest in the Woodpecker Project Area.

The ongoing analyses for Overlook, Fanshaw, and Douglas timber sales on the Petersburg District include effects to recommended rivers. None of the proposed harvest would affect any of the outstandingly remarkable values for the rivers.

The Craig Ranger District has seen no change in the Kegan or Essowah rivers and lakes systems that would indicate effects to the eligibility of these recommended rivers. Only the recreation outstandingly remarkable feature was reported in this monitoring cycle.

The Wrangell Ranger District staffed interpreter positions at the Anan Creek Bear Observatory and monitored the use of almost 2,700 visitors there. Information was collected about the viewing public, outfitter or guide use, and bear behavior. A graduate student from Utah State University developed the bear monitoring protocols during a study of bear behavior at this site. The monitoring of the site shows the recreation use is consistent with what was anticipated in the Anan Management Standards Environmental Assessment completed in 1996. Only the recreation outstandingly remarkable feature was monitored and reported at Anan Creek in this monitoring cycle.

Evaluation of Results:

Standards and guidelines are being implemented, and used to direct management decisions. Eligibility of specific classifications levels recommended in the Forest Plan is being maintained until Congress makes these designations.

It is important to continue analyzing proposed timber sales for their impacts on the eligibility of recommended rivers.

The monitoring project for airborne video flights identified in the 1999 monitoring and evaluation report for Blind River on the Petersburg District was not accomplished, as funding was not available.

Wild and Scenic River Question 2: Are Wild, Scenic, and Recreational River standards effective in maintaining or enhancing the free flowing conditions and outstandingly remarkable values at the classification level for which the river was found suitable for designation as part of the National Wild and Scenic River System?

The Recreational River standards are effective in maintaining and enhancing the free flowing conditions and outstandingly remarkable values.

Monitoring Results:

The outstandingly remarkable value of recreation on Blind River was enhanced in 1999 with two projects: construction of a fully accessible loop trail off the existing trail at Blind River Rapids and reconstruction of a short trail to the Swan Observatory to make it fully accessible. Both of these projects are compatible with the standards and guidelines for Recreational River.

Closing the boat ramp at Blind Slough Picnic Area to trailer launching of boats and other watercraft prevented the conflict and safety hazard of swimmers and boats using the same area at the same time. Hand launching of rowboats, canoes, and other watercraft was still allowed. On September 1, the boat ramp was re-opened to allow access for people who like to use skiffs to Coho fish in that part of Blind Slough. By then, there are very few, if any, swimmers in the area. No negative comments were heard about the closure this summer.

One section of Blind River is closed to motorized vehicles from December 1 to April 1 each year. This closure protects the trumpeter swans that overwinter there. A few times in the past there have been snowmobile tracks in the snow indicating illegal use in the closed area. This illegal use was not noticed in the winter of 1999/2000.

The Petersburg Ranger District continued to close the boat ramp at Blind Slough Picnic Area during the summer months to alleviate the conflict between swimmers and motorized watercraft.

Evaluation of Results

Winter recreation activities on Blind River have not been monitored as closely as summer activities because there is no regular maintenance program for the area in the winter. Most information comes sporadically from Forest Service employees who recreate in the area and report on use levels. When weather conditions allow, ice-skating on Blind River is a very popular activity for Petersburg residents; since good ice conditions are usually not long lasting, the number of people at Blind Slough Picnic Area can be quite high during at those times.

Cross-country skiing and snowmobile use are also popular in the area when snow conditions allow. Since part of the area is closed to snowmobile use in the winter, there is a need to continue monitoring it for compliance. This area is one of the few places in Southeast Alaska where trumpeter swans stay all winter. It is one of the reasons for the high wildlife values in the river corridor.

One emerging issue that could affect the outstandingly remarkable values of Blind River is the possible closure of the Crystal Lake Fish Hatchery. State funding is getting tighter and closure has been considered. Closing the hatchery would be devastating to the salmon fishing at Blind River Rapids. This would harm the outstandingly remarkable values of fish and recreation on the river.

The proposed State ferry terminal at the southern end of Mitkof Island could change recreation use patterns and levels along Blind River. This use will need to be monitored to ensure that the standards and guidelines for a Recreation River are being met and that the outstandingly remarkable values are being maintained.

Wilderness Areas

Goal: Manage designated Wilderness to maintain an enduring wilderness resource while providing for public access and uses consistent with the Wilderness Act of 1964 and the Alaska National Interest Lands Conservation Act of 1980 (ANILCA).

Objectives: In Wilderness, manage for the adopted ROS class. Where ROS has not been adopted, manage for no greater development than Semi-primitive Motorized (with certain localized exceptions due to the effects of activities outside Wilderness and ANILCA exceptions).

Background: Congressionally designated Wilderness in the Tongass National Forest comes from two pieces of legislation. ANILCA established 14 Wildernesses totaling 5.5 million acres within the Tongass. Two of the areas – Admiralty Island and Misty Fiords – were also previously designated as National Monuments. Prior to ANILCA there was no designated Wilderness on the Tongass. In 1990, the Tongass Timber Reform Act (TTRA) amended ANILCA and designated five new Wilderness areas and one Wilderness addition totaling 296,080 acres. This brings the total to 5.7 million acres in 19 Wilderness areas on the Tongass National Forest.

Wilderness Area Question 1: Are standards and guidelines for the management of Wilderness being implemented?

In general, the standards and guidelines for the management of Wilderness are being implemented. Aircraft overflights, boats, and docks are continuing to affect the solitude and primitive Wilderness environment in some Wilderness areas such as Misty Fiords. In these areas, the Wilderness objectives for solitude and primitive recreation are not met. This problem is being addressed through interagency collaborative planning efforts.

The Admiralty National Monument/Kootznoowoo Wilderness reported biological evaluations being completed for Seymour Canal and Hood Bay, a Passport in Time heritage project completed, a lands special use permit being inspected, two administrative cabins inspected, and Windfall Harbor inspected for outfitter and guide uses.

The Craig Ranger District visited five locations on the South Prince of Wales Island Wilderness. These areas included Ruth's Cutoff, Max Cove, West Klakas, Klakas Falls, Kinkwan Cover and Shark Bay. With the exception of the Klakas Falls area, where they found camp debris to clean up, there were no changes to the condition of these sites.

The Juneau Ranger District conducted several monitoring trips for the Tracy Arm-Fords Terror Wilderness, Chuck River Wilderness, and Endicott River Wilderness.

The Ketchikan-Misty Ranger District monitored 11 areas on their district: Point Trollop, Bartholomew Creek, Wilson Arm, Wilson/Blossom Estuary, South side of Smeaton Bay, Lake 560, Point Nelson/Carp Island, South Beam Entrance, Weasel Cove/Badger Bay, Badger Lake, Northeast Arm Boca de Quadra, North Northeast Arm of Boca de Quadra, Keta River Estuary, Marten Arm/Red River, Marten River, Hugh Smith Lake, and Mink Bay. An ecosystem approach to monitoring conditions within Misty Fiords Wilderness was accomplished during the 2000 field season. The monitoring program utilized several resource specialists from across the Forest to gather data and monitor conditions. The inventory/monitoring program is a collection of broad-scaled observational data with the intent to identify resource related trends/concerns. Project monitoring of specific standards and guidelines are supported through repeated observation and documentation.

The monitoring in Misty Fiords Wilderness was completed during collection of inventory data. This inventory provides baseline information to use in comparing Wilderness to non-Wilderness areas. The inventory covers a variety of ecological zones from tidewater to alpine, and the data is recorded per value comparison units (VCUs). A total of 21 VCUs are being inventoried over the course of the project and 17 were included in the FY 2000 work. The inventory work was initiated in 1997 and is intended to continue for the next six years.

On the Petersburg Ranger District and some other districts, recreational sites and cabins were inspected during the annual monitoring process. These cabins were inspected for condition relative to the standards for recreational use.

Monitoring of the status of threatened, endangered, and sensitive species surveys was also addressed on the Petersburg Ranger District.

The Sitka Ranger District monitored the South Baranof Wilderness primarily for recreation uses and for the administration of their outfitter and guide special use permits. Campsite inventories were a part of the monitoring effort.

The Wrangell Ranger District monitored a potential land purchase; special use permits for outfitters and guides, isolated cabins, pre-ANILCA cabins, tent platforms, research studies; various authorizations for the use of motorized equipment within Wilderness; and the management of public recreation facilities and sites. There were also five biological studies conducted on the Stikine-LeConte Wilderness.

Monitoring Results

- Monitoring conducted in Misty Fiords showed that the Wilderness standards and guidelines are being implemented. However, in some areas' docks, aircraft overflights, and boat traffic affect the solitude and primitive environment.
- On Misty Fiords, district staff continued to set the highest example for Wilderness travel, camping, and working using minimum impact and minimum tool standards.
- Cabin condition and trail surveys in Misty Fiords and some of the other districts revealed that a large proportion of the deferred maintenance of recreation facilities/ trails are backlogged and additional funds will be required to bring these structures to an acceptable standard.
- A total of 178 miles of shoreline were monitored in Ketchikan-Misty Fiords, and little trespass was noted. The monitoring encompassed Smeaton Bay, the southeastern shoreline of Behm canal, and Boca de Quadra including Weasel Cove, Bager Bay, Marten Arm, Mink Arm, and Vixen Bay.
- Wilderness ranger visual surveys found that use at the mouth of Petersburg Creek may have exceeded the Semi-primitive Motorized encounter guideline of six parties on several occasions. This was a qualitative observation since no standardized sampling was done to monitor this site.
- The field inspections for *Cotula coronopifolia* found minimal amounts in McDonald Arm and significant amounts in the Duncan Salt Chuck.
- Nineteen heritage sites were discovered in Misty Fiords. Four of these sites were fish traps and two sites were historic cannery sites. One historic mine site was identified and inventoried. A few boat ramps, numerous culturally modified trees, a historic village, cabin, and pictograph were monitored.
- Two trespass cabins were identified on Admiralty National Monument, and administrative actions were started for both cabins.
- Administrative actions were taken to address illegal crab pot storage in the Tracy Arm-Fords Terror Wilderness.
- Twenty-two bald eagle nests were located along the saltwater shoreline in Misty Fiords.
- Two small stands of Silver Fir (*Abies amabilis)* were located in Misty Fiords.
- The Sitka Ranger District found that outfitters/guides operating within the South Baranof Wilderness were in general compliance with the terms and conditions of their special use permits.
- On the Petersburg Ranger District, the standards and guidelines for Recreation and Tourism, Recreation Use Administration, section E. which states, "Maintain existing public use cabins... at present or improved condition," is not being met for the Salt Chuck East cabin. Lack of sufficient funding has prevented heavy maintenance at the Salt Chuck East Cabin, where the front deck is rotten and in need of replacement. The Petersburg Lake cabin is in need of reconstruction and does not meet the standard; funding has been requested from the Region 10 Capital Investment Program for this year to do the work necessary to meet the standard.
- Monitoring showed that inventories have not been done for Threatened, Endangered, and Sensitive Species in the Petersburg Creek-Duncan Salt Chuck Wilderness. This needs to occur, in order to conform to the TES plant species standards and guidelines.

<u>Evaluation Results</u>

- An interagency collaborative planning approach is being utilized to deal with some of the conflicts on the primitive and solitude environment associated with the noise and visual impacts on adjacent marine waters and in airspace in Misty Fiords.
- The non-motorized/non-mechanized example set by the personnel working in Misty Fiords for minimum impact Wilderness travel, camping, and working is continuing to educate visitors to the Wilderness.
- Cabin condition surveys point out the need to bring the cabins up to standard. Cabins and facilities on the Tongass with similar maintenance needs as the Salt Chuck East cabin are currently being addressed either by the district through their regular appropriations, through cabin rental receipts, or through the Regional capitol investment process (CIP).
- The deferred maintenance of recreation facilities/ trails will be emphasized and additional funds will be requested to bring the structures/ trails to an acceptable standard.
- We will continue to monitor the shoreline for outfitter/guide compliance and evidence of trespass.
- The plant monitoring programs in several of the Wilderness areas should continue, to further develop the baseline inventory of these remote Wilderness areas. Plant monitoring will ensure that Wilderness standards and guidelines are being met for Threatened, Endangered, and Sensitive Species, as well as establishing a baseline to monitor plant populations in the Wilderness.
- An approach should be identified on how to administer the *Cotula* species situation in the Petersburg Creek-Duncan Salt Chuck Wilderness. Botanists have been contacted to assist in developing a management plan.
- There are several locations where the level of use is of concern and monitoring needs to continue to determine if any mitigation is required.

Wilderness Area Question 2: Are standards and guidelines for the management of Wilderness effective in maintaining the Wilderness resource?

Monitoring activities are summarized in Wilderness Area Question 1. Time spent in the field or office for implementation monitoring was also used to determine effectiveness. The standards and guidelines were effective in maintaining the Wilderness resource with the exceptions as discussed below. The geographic area's large size and complexity, along with limited budgets, make implementation of standards and guidelines difficult to monitor for effectiveness. Conclusions from the area surveyed during FY 2000 indicate that backcountry physical impacts are minimal and the opportunities are outstanding for remoteness and solitude.

Monitoring Results

The Admiralty National Monument, Juneau Ranger District, and Ketchikan-Misty Ranger District all noted noise impacts from motorized vessels on adjacent marine waters or airways outside Forest Service jurisdiction affecting the Wilderness solitude, remoteness and sense of isolation. The Ketchikan-Misty Ranger District specifically identifies the sites around Rudyerd Bay, Big Goat Lake, Punchbowl Cove and Winstanley Island as being particularly affected within the Misty Fiords National Monument.

On the Petersburg Ranger District, significant quantities of a nonnative plant (Brass buttons, *Cotula coronopifolia*) exist in the Petersburg Creek-Duncan Salt Chuck Wilderness. Wilderness ranger surveys found that the portal to Petersburg Creek-Duncan Salt Chuck Wilderness may be exceeding or near exceeding the recommended encounter levels for a Wilderness Semi-primitive Motorized ROS class.

Evaluation of Results

Generally, standards and guidelines have been effective in preserving the Wilderness character, with the exception of low level of social encounters. These social encounters occur along primary travel ways and areas adjacent to waterways at some locations. Air traffic and cruise ship visitation impacts wildlife, visual quality, remoteness and solitude. Districts will continue to monitor the effects of disturbance from outside the Wilderness such as aircraft uses, and motorboat uses.

There are some inconsistencies and non-conforming activities occurring at some locations. It is often difficult to deal with these impacts due to the jurisdictional issues and varying agency missions that effect multiple resources. For example, the upland management is different than the management of the salt water or air space. Because of this condition, the effectiveness of the standards and guidelines are difficult to evaluate. During fiscal year 2001, a Memorandum of Understanding between agencies with overlapping jurisdiction will be generated to provide greater collaboration in defining these differences.

To and improve this condition, and to improve understanding of Wilderness, a strong education program is required in the schools, at the Discovery Center and with outfitter/guides. Presently, Interpretive Kayak Rangers have advocated not only an understanding of Wilderness ethic to visitors of Misty Fiords Wilderness, but also a greater understanding of forest management and community economics.

The number of encounters are exceeded in Misty Fiords areas around Rudyerd Bay, Big Goat Lake, Punchbowl Cove and around Winstanley Island. Physical use and encounters increase each year. New outfitter/guide interest is on the rise as local economics move away from a predominately timber based economy to a more diversified economic region.

On the Petersburg Ranger District, the Petersburg Creek-Duncan Salt Chuck Wilderness needs a plant inventory/monitoring program. This is indicated by the *Cotula coronopifolia* on the flats of the Duncan Salt Chuck and by aerial photographs showing the plant has been invading the area for probably a decade. It is unknown if this plant will have any effect on TES. Management of nonnative plants is an important issue for the Forest Service. The priority for this issue is highlighted in the Chief's Natural Resource Agenda, the Forest Service Strategy for Noxious Weeds and Nonnative Invasive Plant Management, the Interagency Wilderness Strategic Plan, and the Alaska Region Recreation Strategy. The Forest Plan has no standards and guidelines for nonnative plant management. This issue should be seriously considered for an amendment to the Forest Plan to provide direction for dealing with management of noxious weeds and invasive nonnative species on the Tongass National Forest. Use levels at the mouth of Petersburg Creek need to be monitored more intensively next season to determine if use levels are exceeding the ROS recommended encounters.

Wildlife

The Tongass National Forest provides habitat for 54 species of mammals (including introduced elk), 231 species of birds, and 5 species of amphibians and reptiles. There are an additional 18 species of marine mammals found in Southeast Alaska waters that depend entirely on the ocean environment, and 45 bird and 3 amphibian or reptile species considered casual or accidental visitors to Southeast Alaska. These species provide many opportunities for consumptive and non-consumptive uses, including commercial, sport, and subsistence hunting and photographic and viewing activities. The Forest is rich in its varied and unique species; some of the species found on the Forest in relative abundance (such as bald eagle and brown bear) are threatened or endangered in other parts of the United States.

Goal: Maintain the abundance and distribution of habitats, especially old-growth forests, to sustain viable populations in the planning area. Also, maintain habitat capability sufficient to produce wildlife populations that support the use of wildlife resources for sport, subsistence, and recreational activities.

Objectives: In addition to objectives included in the Biodiversity section, design and implement non-structural wildlife habitat improvement projects to improve an average of 8,000 acres annually across the Forest. Include a young-growth management program to maintain, prolong, and/or improve understory forage production and to increase future old-growth characteristics in young-growth timber stands for wildlife. Additionally, design and implement an average of 75 structural wildlife habitat improvement projects annually across the Forest.

Background: Since the signing of the 1997 ROD, we concluded that the list of Management Indicator Species (MIS) needed to be updated and that current TLMP wildlife monitoring questions are too broad to develop useful monitoring protocols (DeGayner et al 1999). The Information Needs section of TLMP (Appendix B of the MIS report) and the Administrative Study Information Needs Assessment (ASIAN) (Iverson et al. 1998) were particularly useful in selecting a manageable number of MIS and further defining and integrating these monitoring questions.

We also recognized that the methods for monitoring the MIS, such as reviewing harvest statistics, were not adequate and that more complete monitoring protocols needed to be developed.

The number of MIS was recommend to be reduced from 13 to 6. The goshawk, Alexander Archipelago wolf, Sitka black-tailed deer, American marten, brown bear, and northern flying squirrel were selected as potential MIS for monitoring protocol development. They were selected because they played a key role in the development of the old-growth conservation strategy and other wildlife conservation measures implemented in TLMP (DeGayner et al. 1999). However, this recommendation is contingent on interagency agreement that credible and cost-effect monitoring plans can be developed for the species. This report reflects information from fiscal year 2000. Information in this chapter was compiled through March 3, 2001. Any information compiled on the Management Indicator Species subsequent to March 3 will be included in the FY 2001 monitoring and evaluation report.

Wildlife Question 1: Are population trends for Management Indicator Species and their relationship to habitat changes consistent with expectations? (Also see the biodiversity monitoring questions.)

We proposed that the updated list of MIS (DeGayner et al. 1999) discussed above and current TLMP wildlife monitoring questions (USDA Forest Service 1997) be reframed as in Table 2.43 to more tightly tie them with management issues. This table links the monitoring questions with potential environmental "stressors" (i.e., management activities) and in turn links "stressors" of ecosystem integrity with potential MIS species. As described by Noon et al. (1997), "indicators" of the ecological stress are aspects of the biology of the species that can be measured and are influenced by the anthropogenic stressor. MIS task groups will identify the actual "indicators" -- the actual parameters to be measured during monitoring to evaluate the species model. Potential indicators include parameters such as population density, abundance, site fidelity, reproductive rate, mortality rate, home range size, population structure, and so forth. The species-specific task groups are to select indicators based on their apparent demographic significance and strength of tie to the ecological stressor, along with the potential to compare (at a reasonable cost) indicator measurements between landscapes that have been treated differently.

Planning regulations (36 CFR 219.19 (a)(6)) direct that "Population trends of MIS will be monitored and relationships to habitat changes determined." Population trends may be inferred using species-habitat relationships information. This approach involves inferring population trends from trends in amount and condition of habitat over time, based on known relationships between species and habitat.

MIS monitoring and the 2004 Forest Plan Review

The five-year Forest Plan Review will address economic, social, wildlife, fisheries, and other resource issues and identify potential mid-course corrections in the management direction within TLMP. The Forestry Sciences Lab, in an interagency fashion, will lead these analyses. The lab will ask the following questions:

- Are the management strategies meeting plan objectives;
- Are the assumptions under which the plan was developed still valid; and
- Is there new information that would question the ability of the plan to achieve objectives?

This section defines the role and scope of MIS monitoring as it pertains to the five-year Forest Plan Review. MIS monitoring is designed to provide information in support of the evaluation of the conservation strategies (Table 2.43), but a larger, “big picture” approach is needed to actually evaluate the conservation strategies. Evaluating effectiveness of the conservation strategy is a task that would likely never be assigned to any one research or monitoring project. It is an undertaking that would cross disciplinary boundaries. Such an undertaking clearly falls into the domain of synthesis and is larger in scope than MIS monitoring. For example, the evaluation of the efficacy of 1000-foot beach buffers may require information on flying squirrel dispersal patterns, goshawk habitat selection, and efficacy of management practices in the adjacent matrix lands.

Collectively, findings from MIS monitoring, other monitoring analyses, new scientific literature, and administrative studies will feed into workshops and other synthesis efforts to evaluate the management strategies within TLMP (Figure 6).

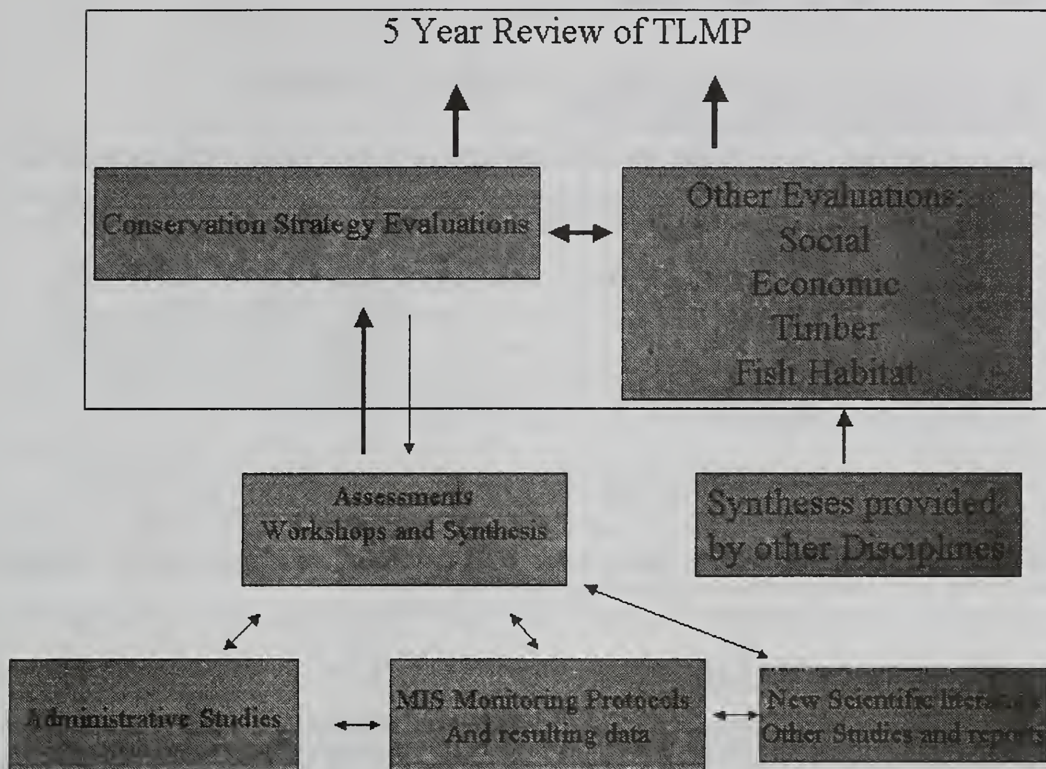


Figure 6. The relationship of how IMEG MIS monitoring contributes to the larger picture of the evaluation of TLMP conservation strategies.

Table 2.43 — Refinement of TLMP Monitoring Questions linked to Stressors, Potential Response MIS, and Key Forest Management Issues

Issue 1: Effects of management on landscape structure and composition on species abundance/persistence (adopted from Iverson et al. (1998).

#	Questions	Stressors	Potential Response MIS
1.a	Reserve system efficacy	Forest fragmentation, habitat loss	HCA design species * used by Suring et al. (1993)
1.b	Landscape strategies - animal dispersal/movement facilitation	Forest fragmentation	***Flying squirrel***, red-back vole VPOP design species
1.c	Effects of partial harvest systems relative to clearcutting	Removal of trees	***Marten, flying squirrels, deer, goshawk***, goshawk prey species
1.d	Effects of timber harvest on populations and, in some cases, human use of these populations	Conversion of old forest to young forest	***Deer***, marten, forest birds
1.e	Riparian Buffer Efficacy	Example: exposure to wind and blowdown	Dolly Varden, Cutthroat trout, Coho, and pink salmon
1.f	Others identified by task groups		

* species most influential in the size, composition, and spacing of reserves.

Issue 2: Effects of human disturbance on wildlife.

	Questions	Stressors	Potential Response MIS
2.a	Efficacy of access management strategies	Road and beach access (S&Gs)	***Brown bear, marten, wolf,*** black bear
2.b	Effects of human disturbance during permitted activities	Road construction, tourism, flight seeing.	Mountain goats, bald eagles, swans, sea lions, harbor seals
2.c	Effects of human disturbance during facility use	Waste management, Defense of Life and Property	***Brown bear***, black bear, harbor seals

Charter for MIS Protocol Development Task Group

In FY 2000, a species task group was established for each of the six recommended MIS. These groups are charged with developing monitoring plans to evaluate how well conservation measures in TLMP protect MIS habitat and populations. Specifically, the task groups are to develop a strategy to evaluate whether population trends for Management Indicator Species and their relationship to habitat changes are consistent with expectations in TLMP. To this end, task groups need to review key assumptions about MIS habitat needs used during the development of TLMP. The task groups are to take a strategic look at how to integrate, if desirable, existing monitoring (Table 2.44) into their monitoring strategy/plan. The team's recommendation will be influential in determining the future course of these studies.

Task groups have been working to develop a habitat model or other relevant model (e.g., effects of road access) for how their MIS is influence by TLMP. The next step is to design studies that test key assumptions of the model using an approach similar to the one outlined by Mulder et al. (1997). This approach requires: 1) specifying goals, 2) identifying stressors, 3) developing a conceptual model, 4) selecting indicators, 5) establishing sampling design, and 6) defining response criteria while ensuring a linkage to decision-making during all steps.

Teams are working to prepare reports that document the process and assumptions used to develop their monitoring plan and costs of implementing the plan. Several alternatives should be presented at varying levels of intensity and rigor of monitoring. Specifically, each report should contain:

1) A literature review, especially of recent literature, and information from recent and ongoing studies;

2) A conceptual model, incorporating assumptions used by TLMP as well as other relevant assumptions;

3) A list of model assumptions to be tested, prioritized by their effects on the model's predicted outcome as well as potential study costs;

4) Study plan proposal(s) for key modeling assumptions;

5) A plan to develop various levels of Forest-wide MIS population trend information that is coupled with a model. This plan should include links to proposals to test key assumptions of the model.

The monitoring plans will differ depending the forest management issue, past studies, and ongoing work on the species. In cases where conservation assessments are available and administrative studies and monitoring activities are ongoing, such as the goshawk (Iverson et al. 1996) and wolf (Person et al. 1996), the monitoring plans may provide additional synthesis. In any case, they may help chart future activities. The plans will determine if existing work is meeting Forest Service needs by formalizing the strategic plan to monitor these species. For species where less is known, such as the flying squirrel, more time may be spent developing a conceptual plan and evaluating what types of information are needed to monitor the species.

To address these management questions and trends in MIS habitat/populations, interagency species-specific task groups are to develop formal monitoring protocols in FY 2000. In the meantime, the Forest Service is supporting several monitoring activities and administrative studies that we believe will be useful for addressing these issues. Table 2.44 summarizes these activities.

Table 2.44 — FY 1999 and 2000 Monitoring Activities Other Than Task Group Protocol Development

MIS Candidate Species	FY 1999 & 2000 Monitoring Activities Conducted by the Forest Service	Activities by Others Likely to Contribute to Long-term Monitoring Efforts.
Black-tailed Deer	1) ADF&G and FS conducted annual pellet count surveys. 2) Mitkof Islands habitat use study and model habitat model review. 3) Level Island deer model review.	ADF&G Heceta deer/wolf study (in 4th year).
Wolf	1) Established 4-yr Challenge Cost Share Agreement with ADF&G to study deer/wolf interactions and wolf biology. 2) Pilot project with Petersburg ADF&G to estimate wolf numbers and movements.	ADF&G Heceta deer/wolf study (in 4th year). Contact: Dave Person/Chris Farmer.
Flying Squirrel	1) FSL flying squirrel study on POW island completes 2nd year. 2) Mitkof Island flying squirrel den study (final year, report spring 2000). Contact K. Hastings, D. Magnuss, V. Bakker.	Flying Squirrel Taxonomy in SE AK. (Joe Cook at University of Alaska, Fairbanks).
American Marten		ADF&G analysis of marten data from NE Chichagof Island.
Northern Goshawk	1) Annual nest monitoring conducted by ADF&G and FS. 2) FS and ADF&G entered into an agreement to update the Conservation Assessment for the Northern Goshawk in SE AK (Iverson et al., 1996) with new information.	
Brown Bear		ADF&G analysis of brown bear data on Chichagof Island.

Executive Summaries of MIS Task Group Reports

The six MIS task groups have prepared draft reports. The task group reports are viewed as working documents that are continually revised as our understanding of the species changes with new research or syntheses. This section summarizes highlights of the reports. These reports will be used by IMEG to generate monitoring proposals for potential funding on an annual basis.

Flying Squirrels

An analysis was conducted to develop priorities for study and monitoring of northern flying squirrels (*Glaucomys sabrinus*), a TLMP Management Indicator Species (MIS). The document lists ten criteria to rank the priorities for potential studies and monitoring projects within and among MIS.

TLMP analyses anticipated that the TLMP conservation strategy would create a high probability of long-term persistence of flying squirrels within each biogeographic province where they currently exist in Southeast Alaska. Furthermore, flying squirrels would have a relatively high likelihood of existing in any one watershed within any one year, though they might disappear from an individual watershed for a few years. The mechanism for achieving these goals was through metapopulation interactions of demes (local subpopulations) of flying squirrels amongst large, medium and small Habitat Conservation Areas (HCAs) – in TLMP referred to as Old-growth Reserves (OGRs) – as well as other land use designations (LUDs) designated in TLMP for no timber harvest. The metapopulation assumption was supported by a TLMP requirement to provide matrix habitat or corridors adequate for flying squirrel movement amongst large and medium HCAs/OGRs. Without connectivity amongst OGRs and other habitats for source populations, TLMP assumed that flying squirrel demes in large and medium OGRs would persist for

intermediate lengths of time (undefined in TLMP), while demes in small OGRs would persist for short periods of time (10-15 years). Given connectivity, the dynamic equilibrium populations in individual OGRs was assumed to be 20 to 40 flying squirrels in small OGRs, more than 50 in medium OGRs, and more than 100 in large OGRs.

Because TLMP does not explicitly require connectivity to small OGRs, flying squirrel demes in some watersheds could die out due to lack of immigration from other demes to "rescue" the isolated deme or to recolonize the isolated watershed. Furthermore, because flying squirrel dispersal behavior, dispersal ability, and dispersal habitat is poorly understood, it is unclear how to design corridors or habitat matrix for dispersal even amongst large and medium OGRs. Owing to this lack of direction and lack of knowledge, the distribution of northern flying squirrels eventually could be reduced to the point that they would no longer be well distributed (defined as in every 10,000-acre watershed) on the Tongass National Forest.

On the other hand, preliminary data from the Forest Sciences Laboratory (FSL) study on Prince of Wales Island (POW) indicates that flying squirrels exist at about 0.3 per acre in unproductive forest delineations (complexes of muskeg, mixed conifer, and even productive old-growth forest smaller than stand size), whereas the assumption during the development of TLMP was that flying squirrels rarely used unproductive forest. Following the collection of more information on flying squirrel demography and dispersal in unproductive forest, it may turn out that flying squirrels do not need connectivity to small OGRs via productive forest stands. Also, if unproductive forest complexes were to support adequate flying squirrel reproduction and survival, then flying squirrels would not need small OGRs to remain well distributed (though small OGRs serve other species, too).

Moreover, preliminary data from the FSL study on POW indicates that flying squirrel populations there are far denser than assumed by TLMP analyses. On POW small, medium, and large OGRs of 1,600, 10,000 and 40,000 acres, respectively (the minimum OGR sizes assumed by analyses during the development of TLMP), may support about 26 times, 100 times and 200 times the populations assumed in TLMP. Because flying squirrel densities are likely far lower north and east of POW where red squirrels are present to compete with flying squirrels, these very high population numbers should not be applied across the Tongass National Forest. Furthermore, of the small OGRs mapped in TLMP, 55 percent have fewer acres of productive old-growth forest (POG) than was assumed by TLMP analyses for the flying squirrel (1,000 acres). Of those small OGRs that are in VCUs greater than 10,000 acres, 39 percent have less POG than is required by TLMP standards (more than 8 percent of a VCU's acres should be in POG within an OGR). Some of these problems should be fixed during project-level planning.

It is impossible to calculate the combined outcome of these divergent contradictions to TLMP assumptions. Flying squirrel abundance in large and medium OGRs on POW are two orders of magnitude higher than the population assumptions of TLMP analyses, while abundance in small OGRs on POW is likely one order of magnitude greater than TLMP assumptions. North and east of POW, flying squirrel abundances in OGRs are still likely higher than TLMP assumptions, but not nearly to the extent as on POW. The higher populations of flying squirrels in the OGRs, along with flying squirrel use of unproductive forest, should significantly enhance the persistence of isolated demes beyond the periods assumed by TLMP analyses. Thus, a well-distributed population is anticipated for this TLMP planning period, despite inadequate knowledge to properly design habitat for connectivity between large and medium OGRs and the lack of direction for connectivity to small OGRs. Information is insufficient at this time to recommend changes to TLMP in regard to flying squirrels.

Several steps are proposed to resolve the information gaps. During fall 2000, work was completed in the field on the current study of habitat use by northern flying squirrels on POW. We anticipate completion of all analyses on data from the current FSL study by FY 2002. During FY 2001 FSL Scientist Smith will conduct a population viability analysis (PVA) using existing data and assuming no limitation exists to squirrel movement amongst OGRs. During FY 2001 and FY 2002, study of flying squirrel dispersal behavior and habitat is planned, beginning with the existing FSL study sites on POW. The annual cost of these efforts would be consistent with recent costs by FSL scientists on flying squirrels – about $115,000 from the Tongass NF and about $16,000 from FSL.

When financially able, we will add study sites to learn about the density and habitat use of flying squirrels where red squirrels exist – one site on the northern Tongass, plus one study site in the central Tongass if

adequate data on density cannot be gleaned from the recent study on Mitkof Island. Other objectives of the FSL work would be to develop a flying squirrel sampling protocol, which later could be used by Tongass NF biologists to monitor – over the long-term – flying squirrel persistence in a random sample of small OGRs stratified by size, subsection, and topology. Each FSL study site would cost about the same as the POW site did, which is about $130,000 annually (mixture of Tongass NF and FSL funds), though for only two field years.

Northern flying squirrels appear to be a good indicator of forest ecosystem integrity because flying squirrels are linked to so many late seral forest elements and processes. Flying squirrels are associated with large trees, large snags, cavities, epiphytes, mistletoe, coarse woody debris, hypogeous fungi, epigeous fungi, lichens, ericaceous shrubs, diverse vertical vegetative structure, and fine-scale connectivity habitat. Flying squirrels may be a keystone species: they are prey for marten, weasels, goshawks and some owls; and they promote forest productivity by spreading mycorrhizal fungi. The abundance and diversity of biota in forest habitat seems likely to correspond positively with increasing habitat capability of flying squirrels. A study on this hypothesized correlation between northern flying squirrel density and the diversity and abundance of other terrestrial vertebrates and plants would provide information as to whether northern flying squirrels are a high quality indicator of the integrity of the forest ecosystem in Southeast Alaska. If conducted simultaneously with the other studies, this potential study would cost about $75,000 annually during three years of data collection.

Wolf

The assumptions made by the Tongass Land Management Plan (TLMP; 1997, 1997b), with regard to wolf viability and habitat management, are reviewed and discussed. Because of an ongoing study by Alaska Department of Fish and Game (ADF&G) in collaboration with the Forest Service, more is known about wolf demographics and the relationship between wolves, deer, and humans on Prince of Wales Island than when TLMP was published in 1997 and 1999. Furthermore, this report identifies information needs for the management and monitoring of wolves and, in conjunction with DeGayner and Lance (2000), identifies the information needs for understanding the wolf-deer-human system. We recommend continued support of the ADF&G deer-wolf-human interaction CCS study, which is providing much needed demographic and habitat linked data for wolves and deer. An ultimate product of this research will be a validated population model for wolves in southeastern Alaska. The model will be spatially explicit, such that inputs can be adapted for different locations.

Deer

Information needs for the management and monitoring of Black-tailed deer habitat and populations are reviewed and prioritized. As part of the review, the TLMP deer model, the joint ADF&G/Forest Service pellet data program, and ongoing administrative studies are described. The most critical set of assumptions used in TLMP are contained in the deer habitat capability model. An example of using an independent set to evaluate the habitat capability model is presented. The report provides strategic advice as to what information would be the most useful for annual TLMP monitoring reports, five-year Forest Plan evaluations, and the development and evaluation of deer hunt regulations. We recommend continued support for existing administrative studies, a systematic evaluation of the existing pellet count program for Forest Service use, and reviews or replacement of the TLMP deer model.

Deer Monitoring Strategy

There are no viability or distribution concerns for Black-tailed deer. Issues center around human use of deer populations. In areas where wolves are present, concerns center around providing enough deer habitat to support both human harvest of deer and wolf predation on deer. We propose using a habitat model to answer whether management strategies provide sufficient habitat to meet plan objectives. In addition, we propose evaluations of the habitat model and literature reviews to address whether the assumptions under which the plan was developed are still valid and whether there is new information that would question the ability of the plan to achieve objectives. This approach is still under interagency review. The approach will be finalized in FY 2001 with additional interagency input.

This approach is superior to the one suggested in the current Forest Plan. Simply monitoring deer harvest statistics and pellet surveys as suggested in the Plan would not meet monitoring objectives. We recommend that the Forest Service conduct systematic evaluations of how these data could be used, however.

Modifications to the Deer model recommended for study

Address the following questions in the deer model:

- How does thinning young-growth shrub-sapling phase stands affect habitat quality?
- How should habitat capability for partial-cut stands be estimated?

Recommended Changes (amendments) to the TLMP analyses or monitoring section

- Adopt 100 deer per square mile for habitat scores of 1.0, unless project-level data suggest otherwise.
- Use 18 deer per square mile as a guideline for the minimum K to support hunting and wolves.
- Do not apply the wolf-induced 36 percent reduction to deer habitat scores when estimating deer available to wolves.

The Forest Service has identified three objectives that pertain to deer: 1) Meet TLMP monitoring obligations for deer, 2) Provide information for deer hunt regulation development and evaluations, and 3) Provide information on wolf/human deer use dynamics. Activities to support these objectives are found in Table 2.45.

Table 2.45 — Alternatives for Black-tailed Deer Monitoring and Research on the Tongass National Forest

	Objective	Activity/Method	Location	Cost/ Priority *
A	Improve information on herd status and composition of kill.			
	i) Evaluate utility of collecting additional information on the deer harvest (survey, jaws, check stations, etc.).	i) Contract with Agency or university.	GMU 2, perhaps 4	10k/high
	ii) Evaluate utility of FS pellet transect program.	ii) Continue in-house GIS analysis.	Tongass-wide	3k/high
	iii) Complete evaluation of DNA markers as a tool to estimate population size.	iii) Continue in-house write-up.	Thorne Bay RD	2k/high
	iv) Conduct annual pellet counts in fy 2001 to track population trends.	iv) Status quo.	Tongass-wide	25k/low to med.
B	Habitat model for the purposes of monitoring impacts of TLMP.			
	i) Evaluate the utility of a nutritionally based habitat model (Hanley and Rogers, 1989).	i) Participate in Sealaska review of deer use of young growth. Provide GIS support.	Mostly north Tongass, but may be able to apply elsewhere.	5k/high
	ii) Identify representative areas across the Forest to test key parameters with field data for existing habitat models.	ii) Work up data set such as Level Island, Mitkof, Heceta.	Islands with independent data sets.	5k/high
	iii) Interagency review of existing deer model.	iii) Similar to Panel Assessment Approach.	Tongass-wide	5k/high
C	Understanding of deer/wolf interactions, deer habitat selection, and deer/wolf demographics.	Support existing studies on POW, Heceta, and Mitkof.	Tongass-wide	50k/yr

* *Note on Costs* - Cost estimates are provided to compare one alternative to another in a relative rank. Detailed budgets have not been prepared. Costs DO NOT include salary or operating contributions by other agencies to the project.

Marten

An analysis was conducted to develop priorities for study and monitoring of American martens (*Martes americana*), a TLMP Management Indicator Species (MIS). This document, along with similar documents for other MIS, will aid in prioritizing funding among MIS and among specific projects for individual MIS on the Tongass National Forest.

This document compares assumptions about martens made in TLMP to findings reported in the scientific literature and data from recent studies of martens in Southeast Alaska. Areas where information does not support TLMP assumptions that are critical for the TLMP conservation strategy for martens are noted.

Several critical TLMP assumptions about martens have strong support in the scientific literature or from studies of martens in Southeast Alaska. The assumption that martens select forest with old-growth features over regenerating stands and that this selection is strongest in the winter is supported in the literature. The literature and local data also support TLMP's assumption that access for fur trapping via roads and beaches can greatly increase mortality of martens.

Some TLMP assumptions have mixed support in the scientific literature or local marten data. Stands partially harvested to 10 to 30 percent canopy cover may serve as habitat during summer and be used for dispersal, but Alaska Department of Fish and Game (ADF&G) marten biologists believe that they would be perceived much like clearcuts and likely would be little used during winter or once regenerating forest shaded out shrub and forb growth. Martens in Maine did use partially harvested stands, but forest in Maine differs greatly from forest in Southeast Alaska, and stands in Maine had much less basal area removed than proposed in TLMP. Although forested habitat in beach fringe and riparian areas are used by martens on Chichagof Island and in drier regions, riparian forest is very important to martens. There is no evidence that such habitat is superior to upland forest as dispersal corridors for martens in Southeast Alaska. However, because beach fringe and riparian forest are important for the conservation of other species, they are logical areas to protect and incorporate as dispersal routes between Old-growth Reserves (OGRs).

Other assumptions in TLMP are not supported, or are contradicted by the scientific literature and local data. Forest stands 100 to 200 years old in Southeast Alaska seem unlikely to provide significantly better foraging habitat than stands 50 to 100 years old. TLMP assumes that openings smaller than two acres will have no adverse effect on martens if openings occupy more than 25 percent of a stand but this has not been tested. No evidence could be found to support TLMP's assumption that leave trees in partially harvested units should be evenly distributed rather than clumped, while speculative insights suggest that clumping leave trees may be better for marten habitat. No evidence exists in regard to the appropriate width of habitat corridors for dispersal, though the TLMP assumption of 330 feet matches the speculative belief of some marten experts. No literature exists in regard to the rate of population exchange that must occur between reserves to maintain metapopulation function. TLMP assumed that large reserves would support 25 adult female martens; however, a study on Chichagof Island indicated that a large reserve of minimal size (40,000 acres) will not support this number of martens during years of low prey abundance, and may not support 25 adult female martens during years of high prey abundance. No scientifically defensible analysis exists to support the assumptions in TLMP regarding the minimum size of a viable population of martens. Due to the heterogeneous nature of the forest in Southeast Alaska, it has not been possible to differentiate demographic factors – productivity, survival and population density – between high volume and medium volume timber strata, nor between uplands and riparian areas.

Many potential questions exist for study or monitoring. However, funds to adequately investigate all of these questions likely will never be available. Therefore, we recommend a comprehensive strategy as outlined in the IMEG Charter to evaluate whether population trends for MIS and their relationships to habitat changes are consistent with the expectations of the Forest Plan. This conceptual framework will help to focus efforts on the most important questions for marten conservation and derive the greatest benefit from available funds.

Monitoring Strategy for American Martens

This plan will rely on both implementation and effectiveness monitoring to evaluate whether the conservation measures in the Forest Plan have the intended effects on populations of martens on the Tongass National Forest. Implementation monitoring will address whether the standards and guidelines for harvesting timber in high value marten habitat are being applied properly and whether the trees and snags retained survive and remain standing through time. Effectiveness monitoring will evaluate whether the partial harvesting schemes and the system of old-growth reserves outlined in the Forest Plan are likely to maintain viable, well-distributed, and harvestable populations of martens through time.

Implementation monitoring is necessary for two reasons. Discussions with timber layout personnel indicate that the marten standards and guidelines are difficult to apply in the field, and a pilot study of the Nemo Loop timber sale on Wrangell Island (Robertsen 1999) found that too few trees and snags of sufficient diameter were retained in partially harvested units. The study plan outlined in Proposal 1 will be used to monitor how well the standards and guidelines are being applied and for how long retained trees and snags provide vertical structure of use to martens.

Effectiveness monitoring will focus on modeling habitat capability and the efficacy of the Old Growth Reserve system, rather than direct estimates of the numerous insular populations of martens. Most data available for model building are derived from a long-term study of martens on Chichagof Island (Flynn and Schumacher 1999). However, this area is not representative of all Southeast Alaska. Distribution of prey animals (MacDonald and Cook 1999) and likely biomass of prey differ by island, and consequently carrying capacity and productivity of marten populations likely differ by island. Also, the value of the matrix as habitat for martens and their prey in heavily logged areas is unknown. Therefore, to build and validate a model to monitor populations of martens that will function throughout Southeast Alaska, additional field data will need to be collected in representative areas.

Proposals 2 through 6 address effectiveness monitoring. In Proposal 2 we propose conducting a population viability analysis and a sensitivity analysis. This initial modeling exercise will be used as a learning tool to gather and determine the usefulness of existing data for model building, to find out for which parameters a model may be most sensitive, to identify knowledge gaps, and to generate proposals for additional field studies. Proposals 3 (Marten density in relation to prey availability) and 4 (Marten ecology in a heavily-logged landscape) detail field studies designed to gather data that we feel will be necessary to build a useful model. Proposal 5 outlines an interagency effort to build a habitat-based model to evaluate the efficacy of the Old Growth Reserve system by modeling changes in habitat and marten populations, and Proposal 6 describes a study to validate predictions of that model. We feel that this strategy will achieve the goals for monitoring populations of martens set forth in the IMEG Charter.

Table 2.46 — Alternatives for Marten Monitoring and Research on the Tongass National Forest

	Objective	Activity/Method	Location	*Cost
A	Monitor implementation of marten standards and guidelines for retaining trees within harvest units.	i) Monitor leave trees within partial harvest units on the ground. ii) Monitor leave trees within partial harvest units with airborne video.	South Tongass	4 k/yr 8 k/yr
B	Evaluate the Forest Plan conservation strategy for marten through population and habitat modeling by determining: i) which parameters drive marten population dynamics on the Tongass. ii) if the system of reserves and nonharvest areas support viable marten populations.	i) Refine spatially explicit habitat model developed by Flynn, Smith et al. using current information or build a new model. Project marten populations into the future to determine effectiveness of the Forest Plan conservation strategy.	Tongass-wide	65k
C	Investigate densities of marten on several islands and the mainland with different prey bases to determine the density of marten within reserves.	i) Use a mark-recapture technique for the mainland and 1-2 islands. ii) document prey availability by collecting blood from live-trapped marten and scats along the road system. iii) census small mammal populations and determine availability of food types.	Tongass-wide	95k
D	Determine the value of the matrix as habitat for martens and provide insight into minimum viable populations of marten in large and medium old growth reserves.	i) radiocollar marten on Prince of Wales Island, collect blood samples. ii) monitor collared martens by ground and by air; document resting sites and reproductive dens. iii) monitor availability of small mammal prey through trapping.	Prince of Wales	169k

* *Note on Costs* - Cost estimates are provided to compare one alternative to another in a relative rank. Detailed budgets have not been prepared. Costs DO NOT include salary or operating contributions by other agencies to the project.

Goshawk

We first divided the TLMP assumptions and questions into three overarching areas:

I) Demographic questions. Does hatching equal or exceed mortality in biogeographic provinces dominated by productive forest land (PFL), except where extensive clearcutting is ongoing? Of foremost concern are the goshawks of POW, including the islands to its west. However, this question also pertains to other biogeographic provinces. Will all biogeographic provinces, which are dominated by PFL, likely have productive goshawks – and not be population sinks – after the clearcutting assumed by the Forest Plan is completed in the distant future?

II) Home range size, overlap and occupancy. How many pairs of breeding goshawks are supported annually (mean $\pm$ SD) in LUD's where no timber harvesting is permitted, with the most emphasis on the portion of the Tongass National Forest where goshawks are dominated by characteristics of the Queen Charlotte subspecies?

III) Partial harvesting. Do partially harvested stands provide useful hunting habitat?

We then listed the types of information that could allow the questions to be answered.

I. Demographic analyses require the following types of information.
- D1. Number of breeding pairs, or number of nest areas.
- D2. Young per breeding pair, or young per nest area.
  - D2a. Nest attempt rate per pair, or nest attempt rate per nest area.
  - D2b. Fledglings per nesting attempt.
- D3. Survival rate from fledging until first breeding.
- D4. Survival rate of breeders.
- D5. Boundaries of subpopulations (demes).
- D6. Immigration/emigration among subpopulations and among biogeographic provinces.
- D7. A predictive habitat capability model, which recognizes that the above parameters are likely to vary with the prey composition of the biogeographic province as well as the habitat composition of each locale.

Only information types D2, D3, and D6 are necessary to answer the first question, on whether hatching equals or exceeds mortality in biogeographic provinces dominated by productive forest land (PFL), except where extensive clearcutting is ongoing. All types of demographic information, D1 through D7, would be necessary to conduct population viability analyses (PVA's) as to whether biogeographic provinces, which are dominated by PFL, are likely have productive goshawks and not be population sinks after the clearcutting assumed by the Forest Plan is completed in the distant future.

II. The question on number of home ranges and annual breeding pairs, which occur within tracts of land without timber harvest, requires the following types of information.
- H1. Size of home ranges.
- H2. Overlap or unused area between adjacent home ranges.
- H3. The nesting attempt rate per breeding home range.

Parameters H1, H2, and H3 are all likely to vary with the prey composition of the biogeographic province as well as the habitat composition of the specific home ranges.

III. The question on the usefulness of partial harvesting could be answered with the following types of information.
- P1. Knowledge on how prey composition and abundance vary with forest structure and composition, stand/patch size, location within stand (edge versus interior), and biogeographic province.
- P2. Knowledge on how hunting success by goshawks varies with forest structure and composition, stand/patch size, and location within stand (edge versus interior).
- P3. Data on goshawk relocations at a fine scale (as compared to scale of GIS information).
- P4. Data from landscape scale experiments, where some landscapes receive extensive amounts of partial harvesting while others are not harvested.

We field-tested satellite telemetry devices during FY 2000, and believe that satellite telemetry will be an efficient and accurate way to gather data with respect to many types of information: nest attempt rate per pair (D2a); survival rate from fledging until first breeding (D3); survival rate of breeders (D4); boundaries of subpopulations (D5); immigration/emigration among subpopulations and among biogeographic provinces (D6); size of home ranges (H1); overlap or unused area between adjacent home ranges (H2); nesting attempt rate per breeding home range (H3); number of breeding pairs (D1) or breeding pair density based on H1, H2, and H3. Satellite transmitters cost about $3,000 each, but they cost under $10 per relocation (including costs of both transmitter and information retrieval) – about 5 percent of the cost of a relocation point with aerial telemetry. Moreover, aerial telemetry is biased owing to only occurring during good weather from mid-morning to middle or late afternoon, and animals are missed if they move beyond the route of the airplane. Finally, satellite telemetry locations are frequent enough to provide high quality data for both home range and survival.

Goshawks, whether located during timber sale inventories or annual nest area monitoring, contribute to the pool of animals available for satellite telemetry. If we can find several locales over the next few years where we feel fairly confident that we have found the nearest nesting neighbors (at least three neighboring pairs), then satellite telemetry will allow the determination of home range overlap/unused area (H2), which is a critical parameter in determining breeding density and number of breeding pairs (D1). Ground-based monitoring is critical to determine the number of fledglings per nest attempt (D2b). Ground-based monitoring also provides a useful measure of the nest attempt rate per nest site and nest area (D2a), and it can be compared to many citations for these parameters in the scientific literature. Ground-based monitoring is essential when no living member of a pair is carrying a working telemetry device. On the other hand, satellite telemetry is far more accurate and cost effective for assessing the nest attempt rate per pair of goshawks (D2a) or the nest attempt rate per breeding home range (H3).

We need information to make our ground-based inventory and monitoring more effective and efficient. In some future year, we should compare various search techniques at territories known to be occupied using surveyors not familiar with the territories. Meanwhile, we can glean much useful information on the relative efficacy of different techniques by completing and analyzing the Tongass goshawk inventory and monitoring database, which has been funded in FY 2001 under the Natural Resource Inventory System (NRIS). Upon completion of the database, analyses can provide inventory and monitoring results in terms of rates per unit of search effort, which are more appropriate for comparisons across years, among geographic provinces, and among landscape habitat compositions.

Information on prey abundance with respect to habitat is necessary to understand how prey composition and abundance vary with forest structure and composition, stand/patch size, location within stand, and biogeographic province (P1). Such information, along with earlier mentioned data, would be useful in creating a predictive model of habitat capability (D7). At this time we are not advocating a new study on prey habitat relationships. We are proposing that a Forest Service biologist spend fall and winter of FY 2002 analyzing previously collected information. In 1990 and 1991 many data (~$300,000) were collected near Petersburg, which related bird counts to forest structure and composition. Furthermore, over the past 10 to 12 years large amounts (~$1,000,000) of bird abundance data were gathered during projects of the Forest Service program for Neotropical Migrant Birds and Landbirds. This bird abundance information could be related to the GIS database and biogeographic province.

In conclusion, the work proposed herein should fully address the first two overarching areas' information needs: I) demographics; and II) home size, overlap and occupancy. It is not economically feasible to directly address area III, on the usefulness of partially harvested stands, though we have proposed analysis of existing information that might infer an answer for the information need on prey abundance (P1). We have also suggested, at a lower priority, potential study that may provide insight into forest structure for hunting (P2) and use forest structure (P3). All information will be useful in creating a predictive model on habitat capability (D7) and in conducting PVA's.

The following tables display funding options for consideration by IMEG.

Table 2.47 — Alternatives for Northern Goshawk Monitoring and Research on the Tongass National Forest

	Objective	Activity/Method	Location	Cost
A	Long-term nest area monitoring to track re-use of nests and nest areas. i) Track long-term patterns in use and turnover at nesting sites. ii) At a population level, the objective of goshawk monitoring is to evaluate general, long-term population/demographic patterns, pooling across all habitats and management conditions on Tongass.	i) Visit nests according to specified protocol and level of rigor. ii) Maintain status quo of ad hoc VHF radio marking to track nesting status in future years; no habitat data OR use PTT satellite telemetry to determine fate of goshawks.	Tongass-wide	110k/yr
B	Long-term nest area monitoring to track re-use of nests and nest areas on south Tongass. i) Track long-term patterns in use and turnover at nesting sites on south Tongass. ii) At a population level, the objective of goshawk monitoring is to evaluate general, long-term population/demographic patterns, pooling across all habitats and management conditions on south Tongass.	Same as Alternative A.	South Tongass only	80k/yr
C	Long-term nest area monitoring to track re-use of nests and nest areas and evaluate demography by landscape. i) Track long-term patterns in use and turnover at nesting sites. ii) At a population level, the objective of goshawk monitoring is to evaluate general, long-term population/demographic patterns, pooling across all habitats and management conditions on Tongass. iii) If the objective is to evaluate differing demographics in various landscapes to understand the efficacy of forest plan.	i) Visit nests according to specified protocol and level of rigor. ii) Maintain status quo of ad hoc VHF radio marking to track nesting status in future years; no habitat data OR use PTT satellite telemetry to determine fate of goshawks. Increase sample sizes of marked birds, increase survey efforts in various landscapes (MIS task group recommendations).	Tongass-wide	150k/yr
D	If the objective is to determine the efficacy of the forest plan in locations where management activities have likely had the greatest impact on goshawks (Prince of Wales Island).	Develop a community-based goshawk project that includes study of both predator (goshawk) and prey (flying squirrel – [goshawks don't eat them] and grouse).	Prince of Wales Island	200-400k/yr
E	If the objective is to evaluate monitoring and research activities over the past nine years and develop habitat and/or population models.	i) No field work other than attempted removal of radio-tags. Perform 1-2 years of ADF&G data analysis. ii) Develop model(s). iii) Identify specific future monitoring & research needs.		60k/yr

Note on Costs - Cost estimates are provided to compare one alternative to another in a relative rank. Detailed budgets have not been prepared. Costs DO NOT include salary or operating contributions by other agencies to the project as has been the norm for the past nine years.

Table 2.48 — Pros and cons of Northern Goshawk Monitoring and Research on the Tongass NF

	Objective	Advantages of Study	Disadvantages of Study
A	Long-term nest area monitoring to track re-use of nests and nest areas. i) Track long-term patterns in use and turnover at nesting sites. ii) At a population level, the objective of goshawk monitoring is to evaluate general, long-term population/ demographic patterns, pooling across all habitats and management conditions on Tongass.	Experience and skills currently exist to continue study. Provides continuity over time. Some birds already radio-tagged so "keeping up" with them still possible. Examining lifetime reproduction and movements useful for understanding link between ecological relationships and forest management. Uses interagency funds and expertise.	Technician staff turnover hinders district oversight, efficiency and continuity. Low power to detect trends. Nests not found in random manner. Very difficult to keep trapping same goshawks. Too many multi-faceted and blurred objectives between research and monitoring. Expensive. Depends on interagency expertise unless FS hires or redirects staff.
B	Long-term nest area monitoring to track re-use of nests and nest areas on south Tongass. i) Track long-term patterns in use and turnover at nesting sites on south Tongass. ii) At a population level, the objective of goshawk monitoring is to evaluate general, long-term population/ demographic patterns, pooling across all habitats and management conditions on south Tongass.	Experience and skills currently exist to continue study. Focuses surveys in areas with the most intensive timber harvest – both past and present.	Technician staff turnover hinders district oversight, efficiency and continuity. Low power to detect trends. Can we locate enough nests? Nests not found in random manner. Very difficult to keep trapping same goshawks. Expensive. Depends on interagency expertise unless FS hires or redirects staff.
C	Long-term nest area monitoring to track re-use of nests and nest areas and evaluate demography by landscape. i) Track long-term patterns in use and turnover at nesting sites. ii) At a population level, the objective of goshawk monitoring is to evaluate general, long-term population/ demographic patterns, pooling across all habitats and management conditions on Tongass. iii) If the objective is to evaluate differing demographics in various landscapes to understand the efficacy of forest plan.	Experience and skills currently exist to continue study. Marking birds has the very important advantage of being able to keep track of both birds and nests over time. Increases sample sizes over those currently available for analysis. Could answer questions relevant to Forest Plan.	Can we locate enough nests in various landscapes to gain power not previously achievable? Can enough birds be tagged? Very difficult to keep trapping same goshawks. Very expensive. Depends on interagency expertise unless FS hires or redirects staff. ADF&G cannot provide active oversight for a project at this level while performing data analysis and writing unless funding is increased.
D	If the objective is to determine the efficacy of the Forest Plan in locations where management activities have likely had the greatest impact on goshawks (Prince of Wales Island).	Community-based projects have appeal because predator + prey studied together. Focusing on areas of intensive timber harvest has high scientific merit. Could answer questions relevant to Forest Plan.	Goshawks "don't eat" flying squirrels. Not sure enough goshawk nests could be found to have meaningful results. Already tried finding nesting goshawks on POW but experienced challenges. Experience suggests that study plan might be sound but execution might be impossible.
E	If the objective is to evaluate monitoring and research activities over the past nine years and develop habitat and/or population models.	Ability to critically analyze and evaluate data acquired to date. Perform analysis with staff who collected data. Perform analyses before proposing further study. Could use existing data to develop best possible model for future work. Costs decrease.	Very difficult and expensive to start-up future field work – loss of movement/tagged birds No active field monitoring. Need to remove radio tags where possible or place new tags on selected birds in "bet-hedging" mode. Data analysis mode will still have some field work and expense.

Brown Bear

Priorities for the study and monitoring of brown bear populations and habitat are developed in this analysis. The key assumptions made by the Tongass Land and Resource Management Plan (Forest Plan, USDA 1997) in the process of developing the conservation strategy for brown bears are reviewed and discussed. The current strategy emphasizes protection of known high-value brown bear areas, protection of riparian habitats, control of human access and sanitation management, and a system of old-growth reserves as critical to maintaining viable and well-distributed populations of brown bears in Southeast Alaska.

The assumptions behind this strategy are consistent with brown bear data reported in scientific literature and results from recent studies of brown bears in Southeast Alaska. Little has emerged in recent research that would challenge the validity of Forest Plan assumptions. However, Forest Plan direction regarding development of bear viewing sites, if not carefully managed, does have the potential to conflict with other measures intended to reduce the potential for bear-human conflicts. Therefore, research and monitoring of the potential impacts of bear-viewing sites on brown bears is warranted. Research and monitoring designed to address anadromous fish habitat capability, important brown bear foraging sites, implementation of sanitation guidelines, and the human aspects of human-bear interactions are also suggested. Additionally, emergent issues such as the potential impacts of recreation and beach access and growing demand for outfitter/guide permits deserve attention in future research and monitoring efforts. A monitoring strategy for brown bears, other than the one already found in the Forest Plan, had not been developed in fiscal year 2000 but a strategy is planned to be developed in fiscal year 2001.

Table 2.49 — Alternatives for Brown Bear Monitoring and Research on the Tongass National Forest

	Objective	Activity/Method	Location	Cost *
A	Provide information to assist implementation of TLMP standards and guidelines for protection of important brown bear foraging sites.	i) Monitor brown bear use of 500-foot riparian buffer using existing radio-collared bears.	North Tongass	30k/yr
		ii) Establish protocols for identifying important brown bear foraging sites.	Tongass-wide	25k/yr
B	Monitor compliance with TLMP standards and guidelines designed to reduce disturbance and DLP mortality to brown bears.	i) Monitor implementation of TLMP 500-foot riparian buffer Standard and Guideline.	Tongass-wide	5k/yr
		ii) Monitor implementation of mandated sanitation practices at permanent and temporary human developments on National Forest lands.	Tongass-wide	8k/yr
		iii) Evaluate effectiveness of public education programs in reducing the number of human-bear incidents.	Tongass-wide	10k/yr
C	Evaluate effects of access management strategies on brown bear mortality.	i) Evaluate brown bear vulnerability to hunting and non-hunting mortality in areas with different access regimes, using existing radio-collared bears.	North Tongass	30k/yr
		ii) Calculate open road density in OGRs where brown bears occur.	Tongass-wide	5k
		iii) Monitor vehicle traffic levels on open roads in OGRs where brown bears occur.	Tongass-wide	10k/yr
D	Evaluate potential effects of recreation and viewing on brown bears at developed and undeveloped sites.	i) Conduct pilot study to evaluate potential effects of recreation and viewing at undeveloped bear use areas (estuaries and streams) on brown bears.	South Tongass	15k
		ii) Evaluate growth potential for human recreation and bear viewing at important bear use sites.	Tongass-wide	5k

* *Note on Costs* - Cost estimates are provided to compare one alternative to another in a relative rank. Detailed budgets have not been prepared.

Monitoring Strategy for Brown Bears

This strategy will rely on both implementation and effectiveness monitoring to evaluate whether the conservation measures in the Forest Plan have the intended effects on populations of brown bears on the Tongass National Forest. Implementation monitoring will address whether the standards and guidelines for sanitation, access management strategies, and important brown bear foraging sites are being applied and will, wherever possible, identify potential barriers to their implementation. Development of protocols for identifying important brown bear foraging sites will aid implementation efforts. Effectiveness monitoring will evaluate the degree to which the 500-foot buffer provides protection for brown bears at riparian foraging sites. It will also evaluate public education programs designed to reduce the number of bear-human incidents to determine their success. Effectiveness monitoring will also evaluate the efficacy of access management strategies in reducing human-caused brown bear mortality by examining mortality patterns in relation to human access. Open road density and traffic patterns in old-growth reserves (OGR) will be examined because of the role that access management played in establishing the brown bear conservation strategy.

Two proposed research projects – one on bear use of the 500-foot buffer, and another on vulnerability of brown bears to human mortality in relation to human access – will both capitalize on the presence of bears that are currently radio-collared and therefore have lower associated costs. Other efforts will include a pilot study to explore potential effects of dispersed recreation on brown bears. This will lead to further refinement of study design and research needs for this topic. Another important research endeavor will be examination of the growth potential for bear viewing and other recreation that could potentially have implications for bear use of important foraging sites and human-bear interactions.

We feel that this strategy will achieve the goals for monitoring populations of brown bears set forth in the IMEG Charter.

Wildlife Question 2: Are the population levels and associated distribution of mammalian endemic species on islands and portions of the mainland consistent with the estimates in the Forest Plan?

According to the TLMP Monitoring and Evaluation Guidebook, this question is answered through an annual report on the progress of the small mammal study specified in the Information Needs section of the Forest Plan (Appendix B-2, Forest Plan). This study is continuing through the year 2001. Additional information describing this study is included in the Research section of this report.

Monitoring Results

Small Mammal Trapping

Small mammals trapped by Forest Service personnel in 1999 were identified in 2000 as representatives of a new species for the Tongass and for Alaska. Among the small mammals trapped as part of inventory efforts in 1999, University of Alaska Museum personnel identified four heather voles (*Phenacomys intermedius*) trapped near Hyder (three voles) and LeDuc Lake (one vole). Identification of these individuals led to the discovery that other representatives of this species had been previously collected near Glacier Bay but had been misidentified. The occurrence of this species in the Hyder and Leduc Lake areas was not a great surprise because the species had been previously trapped nearby in British Columbia. However, the discovery of *P. intermedius* among specimens collected near Glacier Bay was surprising and represents a significant expansion of the known range of the species.

Although the official cost-share partnership between the Forest Service and the University of Alaska Museum ended in 1999, some small mammal trapping continued on the Tongass in 2000. Small mammals trapped as part of the studies below or other Forest Service projects or inventories were still being accepted by the museum for identification, tissue/genetic analysis, and storage. This continuing exchange of information contributes data needed to evaluate distribution and endemism of small mammals in Southeast Alaska. Federal legislation in NEPA 1973, ESA 1973, and NFMA 1976 mandated conservation of biological diversity. This study contributes information to fulfill commitments in the Forest

Plan and the 1999 Record of Decision to evaluate biodiversity and population viability of endemic mammals.

Density and Demography of Endemic Small Mammals

During FY 2000, the Forest Science Laboratory in Juneau continued studies initiated in 1998 of the habitat relationships of Prince of Wales (POW) flying squirrels and red-backed voles. The focus of these studies is to determine habitat relationships and estimate densities and other population parameters of these two endemic species in different habitat types. This was the third and final season of field work for both studies, and it included six trapping areas of two prominent cover types for flying squirrels on POW, and eight trapping areas of four cover types for red-backed voles on Wrangell Island. Analysis of 2000 data and final analysis of all data are not yet completed.

The objectives of these studies include documenting the following in commercial forest habitat:

1. Flying squirrel and vole abundance and densities in different habitats;
2. Age and sex composition of study-grid samples;
3. Proportion of productive females;
4. Microhabitat features associated with capture of individuals and age and sex groups.

These studies provide data to satisfy the commitments of the 1999 Record of Decision to increase studies of small endemic mammal populations. They also provide baseline ecological information regarding habitat distribution and abundance among four important habitats for species endemic to Southeast Alaska. This information will contribute to development of wildlife habitat relationship models to be used to determine habitat needs and potential impacts of timber harvest on populations of these endemic species.

Evaluation of Results

No findings from research of small endemic mammal species suggest the need at this time for changes to the conservation and viability strategies detailed in the Forest Plan and 1999 Record of Decision. Final analyses and documentation of these research efforts should be completed in 2001, at which time changes in management strategies for these species may be recommended.

Costs and Outputs

Costs and Outputs Question 1: What outputs were produced in the previous year?

Monitoring Results

This output information was obtained from the final FY 2000 Management Attainment Report, which was submitted to the Regional Office in October 2000. In some instances, targets were not accomplished due to personnel being detailed to fires in the lower 48 states.

	Accomplished in FY 2000	
Land Management Plan		
Monitoring and Evaluation Report	3	Reports
Ecosystem Management		
Stream Surveys	33.5	Miles
Lake Surveys	14,300	Acres
Terrestrial Ecological Inventories (eco-subregion)	17,000	Acres
Terrestrial Ecological Inventories (land unit)	3,400	Acres
Water Resource Monitoring	8	Sites
Recreation Use Monitoring	150	Days
Vegetation Inventory (eco-subregion)	1,115	Acres
Heritage Resource Inventories	1,500	Acres
Recreation, Wilderness, and Heritage Management		
Seasonal Capacity	2370	PAOT Days
Special Use Permit Administration	328	Permits
Annual Wilderness and Leave No Trace Education	13.8	Contacts
Wilderness Meeting Forest Plan Standards for Physical and Social Conditions	5,593.9	Acres
Sites Preserved and Protected	120	Sites
Sites Evaluated	54	Sites
Sites Interpreted	21	Sites
Wildlife Management		
Terrestrial Wildlife Habitat Restored or Enhanced	146	Acres
Fisheries Management		
Inland Fish Streams Restored or Enhanced	15	Miles
Inland Fish Lakes Restored or Enhanced	466.5	Acres
Anadromous Fish Streams Restored or Enhanced	102.5	Miles
Anadromous Fish Lakes Restored or Enhanced	6,447.5	Acres
Threatened and Endangered Species Management		
Number of Sensitive Species for Which Conservation Actions were Accomplished	1	Species

Range Management

Noxious Weeds Treated	20	Acres

Timber and Forest Vegetation Management

Timber Volume Offered	85.3	MMBF
Timber Volume Sold	170.3	MMBF
Timber Volume Harvested	146.9	MMBF
Forestlands Maintained or Enhanced by Stand Improvement	3,792	Acres
Lands Restored by Reforestation	2,345	Acres

Soil and Water Management

Soil and Water Resource Improvements	902	Acres

Minerals Management

Abandoned Mine Land Sites Reclaimed	7	Sites
Bonded and Non-bonded Non-energy Operations Processed	104	Operations
Bonded and Non-bonded Non-energy Operations Administered to Standard	8	Sites

Land Management

Rights-of-Way Acquired	8	Cases
Special Use Applications Processed	141	Permits
Special Use Permits Administered to Standard	165	Permits
Land Classification	4	Cases
New Boundary Marked to Standard	43	Miles
Special Area Boundary Location	2	Miles

Road, Trail, Dam, and Bridge Management

Road Construction/Reconstruction	72.3	Miles
Road Bridge Construction	16	Bridges
Access Improvement (Deferred Maintenance)	94.6	Miles
Annual Road Maintenance	3212	Miles
Roads Decommissioned	30.2	Miles
Trail Construction/Reconstruction	6.9	Miles
Bridges Inspected as Scheduled	90	Percent
Dams Inspected as Scheduled	100	Percent

Costs and Outputs Question 2: Are the costs associated with carrying out the planned management prescriptions (including those of producing outputs) consistent with those costs estimated in the Forest Plan?

<u>Monitoring Results</u>

These allocation and expenditure amounts were obtained from the preliminary September 2000 fund control report and the information the Forest submitted to the Regional Office for missed year-end obligations. Because the due date of this monitoring report is in November, the final FY 2000 financial reports were not available for use. Also, there are still problems with some of the FFIS feeder systems' (i.e., PCMS) information not getting into FFIS completely or in some cases correctly, so the expenditures shown here may not be 100 percent accurate.

It is difficult to make a comparison on the expenditures with FY 2000 vs. prior years. FY 2000 was the first year that the Tongass NF had all accounting and dollar allocations under one region/unit (1005) combination. Prior to that, dollars and expenditures were in three region/units (1002, 1003, 1005) and not all of the information is available to make the comparison.

Some funds (i.e., NFIM) were received at the Forest level late in the fiscal year, making it difficult to accomplish projects and to spend the funds.

EBLI		*Allocated* FY 2000 Budget	*Spent* FY 2000
NFIM	Ecosystem Plan/Inv/Monitor	$2,133,763	$1,404,772
NFPN	Land Management Planning	216,952	267,735
NFMG	Minerals and Geology	586,564	466,390
NFLA	Real Estate Mgmt	1,251,405	1,092,763
NFLL	Landline Location	560,801	484,540
NFLE	Law Enforcement	280,137	305,758
NFTM	Timber Management	20,089,545	14,524,473
NFRV	Range Vegetation Mgmt	40,400	19,525
NFFV	Forest Vegetation Mgmt	1,027,416	933,105
NFRM	Recreation Management	3,197,117	3,251,442
NFWM	Wilderness Management	1,448,702	1,374,158
NFHR	Heritage Resources Mgmt	327,940	335,062
NFWL	Wildlife Operations and Mgmt	558,629	572,891
NFIF	Inland Fish Ops and Mgmt	341,994	259,387
NFAF	Anadromous Fish Ops and Mgmt	3,886,328	3,530,371
NFTE	T&E Species Ops and Mgmt	132,400	86,778
NFSO/SI	Soil-Water-Air	4,097,132	3,890,308
NFGA	General Admin.	3,664,000	3,842,025
SMSM	Subsistence Mgmt	1,442,800	1,528,952
WFPR	Fire Management/Suppression	331,073	358,626
PAMF	Facilities Maintenance	3,337,806	2,838,840
PAFC	Facilities Recon & Const.	3,529,230	1,713,080
PAMR	Road Maintenance	2,988,590	3,082,257
PARD	Road Construction	4,610,509	3,763,542
PAMT	Trail Maintenance	834,353	785,026
PATC	Trail Construction	4,364,102	1,914,286
Total Costs		65,279,688	52,626,092
CWKV	KV	1,331,882	996,151
SSSS	Salvage Sale	2,054,474	1,456,989
Total		**3,386,356**	**2,453,140**

Chapter 3

Evaluation and Action Plans

Chapter 3
Evaluation and Action Plans

Introduction

Chapter 3 is comprised of an evaluation of the monitoring conducted in fiscal year 2000 and action plans based on the evaluation. Through synthesis of the monitoring results, this evaluation provides insight as to whether we are moving toward forest goals and desired conditions. The action plans outline the procedures we will follow to move further toward forest goals and desired conditions.

This evaluation is written in the context of the USDA Forest Service Strategic Plan (2000 Revision) goals. These goals and the objectives of the Strategic Plan were developed to guide future agency actions. The four goals are:

Goal 1: Ecosystem Health
Goal 2: Multiple Benefits to People
Goal 3: Scientific and Technical Assistance
Goal 4: Effective Public Service

The desired conditions as defined in the Tongass National Forest Land and Resource Management Plan are shown in Table 1 in Chapter 1 of this monitoring report.

A crosswalk showing the relationship of the monitoring questions defined in the Tongass National Forest Land and Resource Management Plan and the USDA Forest Service Strategic Plan (2000 Revision) goals is shown in Chapter 2 of this report. A table excerpt from the USDA Forest Service Strategic Plan, included earlier in this monitoring report, illustrates the specific goals and the associated objectives of the Strategic Plan.

In the evaluation sections below, the goal and objectives are listed with a summary of the status of the Tongass relative to each goal. Following the evaluation sections is an action plan that reveals a strategy to orient the Forest toward the goals.

Goal 1: Ecosystem Health

Promote ecosystem health and conservation using a collaborative approach to sustain the Nation's Forests, grasslands and watersheds.

Objective 1.a—Improve and protect watershed conditions to provide the water quality and quantity and the soil productivity necessary to support ecological functions and intended beneficial water uses.

Objective 1.b—Provide ecological conditions to sustain viable populations of native and desired nonnative species and to achieve objectives for Management Indicator Species (MIS)/focal species.

Objective 1.c—Increase the amount of forests and grasslands restored to or maintained in a healthy condition with reduced risk and damage from fires, insects and diseases, and invasive species.

The Forest's ecosystem health is reflected primarily in the answers to the monitoring questions on implementation and effectiveness monitoring associated with air quality, biodiversity, fish habitat, karst and caves, minerals and geology, recreation and tourism, soil and water, transportation, wetlands, and wildlife. These questions relate the monitoring of the implementation and effectiveness of the standards and guidelines associated with the various forest resources.

Objective 1.a

Objective 1.a—Improve and protect watershed conditions to provide the water quality and quantity and the soil productivity necessary to support ecological functions and intended beneficial water uses.

In reference to Objective 1.a, the monitoring completed on fish habitat, soil and water, wetlands, air quality, karst and caves, minerals and geology, recreation, and transportation describe the status of the Forest relative to ecosystem health. Significant issues addressed in the monitoring this year include items shown in the three categories below.

Fish Habitat, Soil and Water, Wetlands:

Water quality relative to riparian area designation and protection.
Water quality relative to buffer zone design and layout.
Water quality relative to stream channel protection.
Water quality and quantity relative to fish passage.
Water quality relative to turbidity, sediment transport, and temperature.
Water quality relative to buffer stability and buffer effectiveness.
Soil productivity relative to disturbance.
Soil productivity relative to erosion.
Wetland quality and productivity.

Air Quality, Karst and Caves, Minerals and Geology:

Air quality relative to State and Federal standards.
Karst and cave resources relative to water quality.
Minerals and geology relative to water quality.

Recreation and Transportation:

Recreational off-road vehicle effects on soil productivity and water quality.
Roads and log transfer effects on soil productivity and water quality.

Fish Habitat, Soil and Water, Wetlands

Best Management Practice Implementation Monitoring

Evaluation:

The Forest implements the standards and guidelines for protection of soil and water resources through application of Best Management Practices (BMPs). These BMPs are described in the Soil and Water Handbook (Forest Service Handbook 2509.22, October 1996). This implementation is monitored through a process (defined in the Tongass Monitoring Strategy) that occurs during and immediately following timber sale and road construction administration.

Specifically addressing riparian area designation and protection, stream channel protection and buffer design and layout, these Best Management Practices were successfully implemented on the Tongass. The timber sale administrators worked effectively to implement stream prescriptions, riparian area designations, and stream buffers. Reviewing implementation monitoring results, the BMPs were fully implemented in 97 percent of these situations relating to riparian areas and buffers and corrective action was applied in 10 percent of the situations.

The Best Management Practices associated with timing restrictions for construction activities and culvert/bridge designs and installation were successfully implemented on the Tongass. The engineering construction contract administrators have worked with the fish biologists to design and oversee installation of bridges/culverts to provide fish passage where required. Reviewing the implementation monitoring results, the BMPs were fully implemented in 98 percent of the situations relating to timing and culvert design/ installation and no corrective actions were applied.

The other issues addressed in the BMP implementation monitoring process include soil disturbance and soil erosion. These BMPs include practices for minimizing surface erosion, revegetation of disturbed areas, identification and avoidance of unstable areas, yarding systems to protect soil/water resources, landing location and design, erosion control measures on roads and units, measures to minimize mass failures, drainage control structures to minimize erosion and sedimentation. The timber sale administrators worked with the timber sale contract operators to effectively implement these BMPs. Minimal evidence of soil- water interactions, associated with erosion and sediment transport, were apparent on the ground. Reviewing the implementation monitoring results, the BMPs were fully implemented in 93.5 percent of the situations relating to soil disturbance and soil erosion and corrective action was applied in 13 percent of the situations.

Monitoring of the BMP implementation showed wetland protection measures were implemented on the Tongass. Prescriptions for wetland protection were followed in the harvest units cut in fiscal year 2000. Areas of wetlands were deleted from units primarily during the planning and contract layout phases of the projects. Wetland areas missed during planning and contract layout were deleted during the final layout and contract sale administration. In areas where forested wetland was harvested, partial or full suspension was prescribed and achieved. Additional buffers were added or areas retained in some harvest units to protect wetlands. Very little to no soil disturbance was noted in the harvested wetland areas.

Action Plan:

Considering recent trends in implementation of these Best Management Practices, these BMPs were applied more frequently and implemented more successfully each successive year since 1997. This increase in application of the BMPs in timber units may be partially due to the specific location of the harvest units relative to the streams. This increase may be partially attributed to an increased emphasis on stream identification and prescription. The specific road construction work completed on the Tongass was primarily culvert replacements on Class I and II streams, so relatively significantly more Class I and II crossings were installed this year. Unification of the Tongass and thus a more standardized monitoring strategy coupled with training has contributed to increase the knowledge of the BMPs and implementation monitoring. Minor modifications to the Tongass Monitoring Strategy relative to the 10 percent IDT monitoring effort and the monitoring form are planned in fiscal year 2001. Specifically we propose to have a large and small group IDT review, where the larger group would look at issues directly associated with the implementation of the standards and guidelines and the smaller group would work individually with the district staff, soil specialists, timber sale administrators, yarding system specialists, and construction contract administrators. We intend to add a numerical rating to the form to facilitate review and improve consistency.

Emphasis needs to continue on correctly identifying streams during the site investigation and layout phases of timber harvest unit preparation. The sale area maps and unit cards need to correctly depict the field situations and prescriptions need to be accurate. Action on this emphasis will be completed during the early stages of timber sale preparation.

Continued emphasis will be placed on site-specific designs for steep gradient channels, channels with turbulent flow, and shallow bedrock. Specific site investigation and stream simulation design techniques are recommended for complex or non-standard sites. Additional emphasis needs to be placed on stream identification and prescription relative to habitat and barriers to prioritize installations. Action to improve the site investigation and design process has already been initiated. A workshop was recently held on the Tongass to address fish passage and culvert design/installation issues. The stream simulation methodology is under development and anticipated application of this methodology is planned next fiscal year.

Emphasis associated with soil disturbance and minimizing erosion will continue. These efforts will focus on seeding temporary roads, ensuring water bars are functional, and avoidance and mitigation associated with soil ruts from shovel logging. During completion of the roads and post haul maintenance, continued emphasis will be placed on the BMPs. Efforts will be taken to ensure adequate numbers and spacing of cross drainage ditches and water bars to minimize surface erosion and sedimentation.

The Best Management Practices are being successfully implemented on the Tongass National Forest. The high quality work of the individuals involved with site investigations, layout, unit design, environmental assessment, and contract administration contributed to this success. Training and communication needs to continue to emphasize the protection of wetlands, productivity of soil and maintenance of water quality.

Soil Disturbance Effectiveness Monitoring

Evaluation:

The soil disturbance effectiveness monitoring was completed by comparing the soil disturbance noted in monitoring relative to the soil quality standards. This monitoring was addressed through examining soil disturbance and landslide data. Specifically addressing soil productivity relative to disturbance and erosion, the monitoring completed showed that the management practices implemented (associated with timber harvest and road construction) were effective in protecting the soil resources.

The soil disturbance monitoring consisted of analysis of soil disturbance transects in harvest units. Monitoring was conducted on steep slope gradient harvest units, a pool of harvest units, and units harvested with shovel yarding systems. This monitoring showed that the observed disturbance for full and partial suspension were well within the limits of allowable soil disturbance. The Regional soil quality standards allow for a maximum of 15 percent of a harvest unit to be in a detrimental condition. The total disturbance observed on the steep slope units was 6.4 percent for partial suspension, and 2.9 percent for full suspension. Specific monitoring was conducted on units harvested using shovel yarding methods. The total disturbance observed in the shovel units was 4.8 percent. The total disturbance for the pool of units was 5.7 percent for partial suspension and 2.6 percent for full suspension.

The landslide monitoring provided data on effectiveness of the Best Management Practices specific to identification and avoidance of unstable areas, and measures to minimize mass failures. This monitoring consisted of analysis of data collected in landslide inventories in two adjacent areas where there were old growth stands, as well as harvest units cut in the 1960's through recent times. The monitoring information was a subset of the inventory data collected in landslide inventory activities. The inventory data showed that the main mechanisms that caused the landslides were a combination of effects from timber harvest and road construction combined with heavy precipitation in some cases and in other situations, naturally occurring steep slopes combined with heavy precipitation. Many of the landslides that occurred on steep slopes where timber harvest activity and road construction occurred prior to implementation of the new standards and guidelines that minimize activity on slopes in excess of 72% that show signs of instability. The additional sedimentation in Margaret Creek may have caused some impacts to fish habitat, but due to the complexity of Margaret Creek and salmon productivity it is difficult to quantify the landslide impacts. Additional investigation, data collection and analysis are necessary to infer any substantial conclusions.

Action Plan:

Reviewing the soil disturbance data, the soil scientists recommend no further study nor monitoring of soil disturbance transects. The timber harvest practices and standards and guidelines are providing adequate protection for the soil resources.

The preliminary findings associated with the landslide inventory data indicate that additional monitoring and study is necessary. Restoration of the landslides is planned. A landslide protocol is currently under development and is anticipated to be complete prior to the fiscal year 2001 field season. A need was expressed for information that could show the statistical break of landslide initiation. Additional landslide inventory work is planned for fiscal year 2001.

Water Effectiveness Monitoring

Evaluation:

1) Fish Passage

The monitoring work completed this year provided an evaluation of the effect of current drainage structure and design and implementation practice on fish passage. Most of the current fish passage monitoring work has contributed toward developing a model to predict fish passage in the design of stream crossing structures under different stream conditions. Accessing fish passage is complex with a number of inter-related variables. To date insufficient data currently exists to adequately assess the effectiveness of TLMP fish passage standards and guidelines. Work is under progress to further test the model and assumptions. From our initial analysis, we have identified a need for more information to assess the ability of juvenile coho salmon to pass through structures at various stream flows as well as migration times for these fish. Additional information is needed on the biological implications of a delay in fish migration and migratory behavior of Dolly Varden and cutthroat trout that reside in high gradient headwater streams.

A supplemental assessment was included in the monitoring report that provided an evaluation of the current fish passage capability status of all drainage structures regardless of their design and installation date. This assessment used the fish capability model and assesses mostly older drainage structures designed and installed prior to the effective date of the current TLMP. The results provide information for evaluation of the capability of the structures to provide fish passage at design flows. This information was collected to prioritize drainage structures for more intensive investigation. The structures identified as not meeting current fish passage standards are scheduled for corrective action.

The data for the fish passage evaluation is being collected through the Alaska Region Road Condition Survey. This survey is ongoing; more than 90 percent of the permanent road has been surveyed on the Tongass. Thus far, 536 Class I stream drainages and 911 Class II stream drainages have been identified on the ground and basic road condition survey data collected. Identification of fish stream locations and characterization is complete on these surveyed sites. Critical measurements for fish passage assessment have not been collected on 154 (22 percent) of Class I streams and 378 (30 percent) of Class II structures. Analysis of these structures will be complete as the measurement data is available.

Preliminary assessment of juvenile fish passage is based on a set of assumptions developed that are preliminary and conservative. Approximately 21 percent of the culverts installed in Class I streams and 9 percent installed in Class II streams have conditions that allow unrestricted fish passage. Approximately 30 percent of the culverts in Class I streams and 18 percent of the culverts in Class II streams need further analysis to determine fish passage capability. Approximately 49 percent of culverts in Class I streams and 73 percent of culverts in Class II streams have conditions that are assumed to restrict up stream movement of juvenile fish at certain flows. The assessment process is dynamic; further analysis of these assumptions and the model criteria is ongoing. Based upon the assessment results from the past 2 years, modification of culverts that show fish passage limitations has been initiated.

2) Turbidity Monitoring

Water quality effectiveness monitoring on the Tongass included stream turbidity monitoring of new road construction/reconstruction of culverts. Turbidity monitoring showed that the water quality criteria for turbidity levels for drinking water were met at 26 of 28 sites and the criteria for aquatic supply was met at 27 of the 28 sites with the exceptions occurring at 2 sites on Wrangell Island. This data showed that (in all cases except the Wrangell sites) the downstream turbidity levels were only slightly above the upstream levels. The turbidity levels at the Wrangell crossings primarily seem related to the decomposition of rock surface material compounded by heavy rainfall (12" rain in 17 days). At the two Wrangell installations sites, the water quality met the State Water quality standards 6 days following culvert installation (Alaska Forest Resources and Practice Regulations allows 48 hour variance). An action plan was developed for this site and was implemented at this site. Mitigation was achieved through a series of corrective action measures. These measures to limit sediment transport and erosion included: installation of culverts to direct road runoff water generated by heavy rains, installation of a filter for road ditch runoff, installation of

silt fence, installation of geo-fabric layer covering the degrading road surface rock, and construction of a new more competent cap rock lift on the road surface.

3) Stream Temperatures

Water quality effectiveness monitoring on the Tongass also included stream temperature measurements. Stream temperature monitoring was completed at 23 stations on managed and unmanaged watersheds. The data and results from 9 sites, all on Prince of Wales Island, were available for this report. The Alaska State Water Quality Standards require that the maximum temperature not exceed 20 degrees Centigrade. The preferred temperature for salmon is 15 degrees Centigrade or less. The average stream temperature was between 12 degrees Centigrade and 14 degrees centigrade. The monitoring showed all sites except Hatchery Creek were within the State Water Quality Standards. Hatchery Creek is in a watershed with extensive lakes that contributed to the high temperature regime in this watershed.

4) Culvert Effectiveness

An interagency review of culvert maintenance and replacement sites on Chichagof Island contributed to provide water quality effectiveness monitoring for fish passage. This monitoring showed that although design standards were fully implemented, extensive streambed erosion and scour is occurring in some of the channels. This problem resulted from application of general design standards developed for low gradient streambeds to steep gradient sites. The design process and design standards have been modified since these installations. Recommendations for modifications to these sites have been made by the IDT and will be reviewed by engineering and the Hoonah Ranger District. The District plans to implement corrective actions at these sites as necessary.

5) Stream Buffer Stability

Fish and riparian effectiveness is evaluated through stream buffer stability monitoring. Vegetation in riparian buffers contributes as significant component to maintain the natural range and frequency of aquatic habitat conditions. The status of these buffers is tracked through buffer stability monitoring. Monitoring the incidence of windthrow in riparian buffers will assess if the buffers are retained in a condition found within the natural range of variability. This buffer stability monitoring is completed on a two-year cycle; the sites monitored in 2000 will be re-sampled in 2001, one year following harvest.

6) Channel Condition Assessment

The channel condition assessment study on-going on the Tongass contributed information and protocols for fish and riparian effectiveness monitoring. Channel condition assessment utilizes a cumulative approach; study reaches are limited to low gradient, depositional channels, which respond and retain the signature of many natural and land-management related disturbances throughout the watershed. The biologic component of this study provides a link between the physical measurements, habitat complexity, and the response of salmonid populations. Preliminary analysis has contributed information on sampling plans and methodologies. This analysis has also contributed to further develop hypothesis associated with the physical and biologic response of aquatic habitat in floodplain channels to TLMP watershed management practices.

Action Plan (for items 1 through 6 above):

The knowledge and tools to access water quality and quantity relative to fish passage are evolving. The fish passage analysis model currently is based upon assumptions on stream hydrology, culvert hydraulics, fish swimming abilities, and fish migration needs. These assumptions need to be tested for verification and against the TLMP fish passage criteria. Further comparison between the model criteria and the fish passage criteria included in the Coastal Zone Management Act, Clean Water Act, and memorandum of understanding between the Tongass and the Alaska State Fish & Game is necessary. Work on testing these assumptions and better defining the criteria used in the model is under progress. Expanded application of the model has been initiated and additional data will be available next fiscal year. In an effort to learn additional information about resident fish migration, an administrative study will be initiated in fiscal year 2001. This study will investigate the migratory behavior of Dolly Varden and cutthroat trout in headwaters. Information concerning the relationship between fish movement to time of year, stream stage and size of fish is anticipated. Upon completion of this study, the fish passage

analysis model and additional field trials, we intend to modify our design flow standards for culverts to provide unimpeded passage for these species as required.

Evaluation of the supplemental assessment on fish passage capability status of drainage structures shows that additional work on the assessment criteria and completion of the survey is needed. This assessment provides a baseline of current but preliminary fish passage conditions that can be used to assess the status of fish migration through culvert and bridge structures. This information will be utilized to track the commitment and progress toward maintaining, restoring or improving opportunities for fish migration. Subsequent work to develop and implement action plans for culvert replacement or modification at sites identified as potentially limiting fish passage will continue.

There is currently an initiative toward maintaining, restoring and improving fish passage along Tongass National Forest roads. The initial inventory and survey of all fish streams and their fish passage conditions along Tongass National Forest roads is nearing completion. Through the cooperation of an interagency group, a state-of-the-art fish passage assessment model has been developed and is being continuously improved. Improved standards for drainage structure design in fish streams are being developed. Study plans to better understand fish migration needs are being drafted. There is currently substantial funding available to correct fish passage problems identified through the survey and analysis process. During the 2000 fiscal year BMP implementation monitoring effort, 20 Class I culverts, 31 Class II culverts, 52 Class III culverts, 5 Class I bridges, 3 Class II bridges and 1 Class III bridge were reported as reinstalled or installed. In FY 2001, $1.5 million is planned for culvert replacement work on the Tongass.

The water quality effectiveness monitoring for turbidity showed that generally, the Tongass is meeting the State Water Quality standards. The turbidity levels at all sites (except the Wrangell sites) were in compliance with the State Water Quality standards within the 48-hour variance period. The construction techniques and mitigation taken at the sites, that met the criteria, were successful in maintaining water quality. At the two Wrangell sites water quality criteria was exceeded and successive mitigation on the road construction was implemented to try to reduce the turbidity levels. Recommendations for future sites that exceed the State water quality standards include: developing a site-specific strategy for mitigation, immediate implementation of corrective action, and immediate notification of Forest specialists and staff.

Water quality effectiveness monitoring of stream temperature measurements in selected Tongass watersheds indicate that additional monitoring should continue and be conducted next year. The stream temperature monitoring was completed in part to determine the influences of riparian stand stage and structure on summer stream temperature regimes and associated dissolved oxygen levels. This monitoring was conducted at 23 stations on managed and unmanaged watersheds. Results from 9 Prince of Wales Island, Thorne bay Ranger district sites indicate that the average stream temperatures were within the preferred range for salmon and all sites except Hatchery Creek were within the State Water Quality Standards. Hatchery Creek is in a watershed with extensive lakes that contributed to the high temperature regime in this watershed. Due to the lake influence, the creek temperatures do not provide direct correlation on the influences of riparian stands on temperatures at this site. Recommendations to improve the utility of future temperature monitoring data include: develop a forest-wide temperature monitoring program framework, reselect the monitoring sites to ensure they provide data to determine the influences of riparian stand stage and structure on summer stream temperature regimes, complete characterization of the riparian conditions in each sample watershed, incorporate low flow discharge measurements into the data to evaluate the influence of dissolved oxygen levels, and continuing this monitoring on a long term basis to provide data to detect the influence of climatic cycles.

The interagency review of culvert maintenance and replacement sites on Chichagof Island contributed to monitoring of water quality effectiveness. Several of these sites had maintenance and installation problems that contribute to impede fish passage at certain flows. These problems resulted from applying a standard design developed for a low gradient channel to high gradient channels. To better address site-specific conditions, the design process has been changed to incorporate stream simulation. Specific site recommendations on the Hoonah culverts were proposed by the IDT and corrective action is anticipated. The specific mitigation will be reviewed by engineering and the Hoonah Ranger District and this group will outline the corrective action. The specific construction modifications associate with these sites will be implemented following the project prioritization process.

Review of the channel condition assessment study contributed significant information on water effectiveness monitoring in terms of monitoring protocol. Preliminary information has provided information specific to data needs, sampling methodologies, and hypothesis. The results to date indicate that the habitat assessment protocol is objective, consistent, and repeatable when carried out by well-trained crews. Additional variables including, channel to width ratio, relative roughness, and large woody debris loading will be assessed to determine their sensitivity to management effects. The success of discrimination of distinct habitat conditions along a gradient of management intensity will also be explored. Work in the next year will contribute to assessing these variables in addition contributing toward final analysis.

Wetlands Effectiveness Monitoring

Evaluation:

Work on development of monitoring protocols for wetland effectiveness was continued this year. The methodologies from three studies related to understanding the function of wetlands will be adopted into the protocols. These studies include the Paul Glaser study (*The impacts of forestry roads on peat lands within the Tongass National Forest*), McGee Study (*Effects of forest roads on surface and subsurface flow in southeast Alaska),* and Wet-soil Monitoring Project. The Glaser and McGee studies look specifically at wetland hydrology and how those functions are altered by road construction. The Wet soil Monitoring Project is a validation monitoring project that relates the basic hydrologic functions of various wetland types.

Action Plan:

Work will continue on development of the monitoring protocols for wetland effectiveness. The Glaser study will be expanded to include additional wetland types most impacted by road construction. The McGee study and Wet-soil Monitoring project will be incorporated into the case study monitoring project associated with the fish and riparian synthesis. A wetland classification will be completed under the Natural Resource Information System (NRIS) and will be applied in future monitoring.

Air Quality, Karst and Caves, Minerals and Geology

Air Quality

Evaluation:

The Tongass National Forest summarizes ambient air quality monitoring data that the Alaska Department of Environmental Conservation (ADEC) has collected and analyzed in accordance with the code of federal regulations (40 CFR Part 50). This data is stored in the Environmental Protection Agency's (EPA) Aerometric Information Retrieval System (AIRS) database. The monitoring is focused on the highest priority areas and pollutants. For Southeast Alaska, ADEC has focused most of its efforts during 2000 on monitoring particulate matter in Juneau's Mendenhall Valley. Although the Mendenhall Valley (including about 5,000 acres of Tongass National Forest land) is officially listed as a non-attainment area for PM-10, the levels did not exceed either PM-10 standard on or adjacent to the Tongass National Forest during the five-year period form 1996-2000. The City and Borough of Juneau's control strategy, including its wood smoke control program, and its road paving projects appear to be working. Air quality is meeting state and federal air quality Standards.

Action Plan:

Considering evaluation of the ambient air quality data, we recommend no corrective action with respect to air quality on the Tongass National Forest at this time. We also recommend changing the sampling methods for Air Quality from "annually summarize and evaluate available information..." to "every five years summarize and evaluate information from the State Department of Environmental Conservation and the U.S. Environmental Protection Agency."

Karst and Caves Implementation Monitoring

Evaluation:

Monitoring was completed on projects falling under interim standards and guidelines for karst and caves, as well as projects implemented under the direction of the standards and guidelines in the revised Forest Plan. Work completed under the revised Forest Plan karst and cave standards and guidelines included preliminary inventory, timber unit and road reconnaissance, timber unit layout, and road layout. The standards and guidelines were implemented to the fullest extent practical.

Monitoring of the interim Karst and Cave standards and guidelines focused on the Heceta Sawfly Salvage sale on Heceta Island of the Thorne Bay Ranger District. Monitoring focused on the implementation and effectiveness of yarding prescriptions, stabilization of cutslopes associated with roads, and windfirmness of harvest unit edges and the small buffers surrounding karst features. Special focus was given to effectiveness of yarding techniques used in the harvest of the partial cut prescriptions for feature protection. This island is characterized by catastrophic windthrow events. The implementation of the karst standards and guidelines is dependent upon the effectiveness of the harvest and road construction.

Efforts were made to insure that the karst and cave standards and guidelines were implemented in the planning of the Cholmondeley, Moria, Luck, Staney, Otter Lake, Licking Creek, Gravina Island, Suemez Island, Tuxekan Island and Kosciusko Island Projects. Implementation was completed through resource specialists actions in the planning process, following discussions with contractors and review of their findings, design and analysis of dye trace programs, on-the-ground inventory, resource report writing, writing or review of resource sections of the DEIS or FEIS for the projects, and answering public comments. On the Tuxekan and Kosciusko Island Projects, LIDAR (Light Distancing And Ranging), high resolution Digital Elevation Models (DEM) and high-resolution orthorectified photographs were generated of subject area.

DEIS and FEIS work under the Revised Forest Plan Karst and Cave standards and guidelines included work on the Cholmondeley, Moria, Luck Lake, Staney, Tuxekan, Kosciusko, Otter Lake, Suemez, Gravina, and Licking Creek Timber Sale Projects. These areas were inventoried or are in the process of being inventoried, and the proposed unit pool modified to protect the karst and cave resources where present. An effort was made to protect the function and integrity of the karst systems, rather than individual features. The inventory showed that implementation of the karst and cave standards and guidelines outlined in the Forest Plan was better than in the past.

Action Plan:

Monitoring was completed on timber harvest projects that were implemented under the interim standards and guidelines as well as timber sale planning projects under the revised standards and guidelines. Heceta Sawfly Salvage Sale was modified after it was sold to implement the interim standards and guidelines. The karst and cave standards and guidelines in the revised Forest Plan were implemented in several projects in the DEIS and FEIS planning stages.

The Heceta Sawfly salvage harvest focused on feature protection. This island is characterized by catastrophic windthrow events. Implementation of the karst standards and guidelines was shown to be dependent upon the effectiveness of the harvest and road construction. Continued emphasis of implementation of prescribed timber harvest suspension as well as prudent road location design and construction is essential. Continued monitoring of the implementation of Karst and Cave standards and guidelines is planned.

The project planning efforts associated with development of DEIS and FEIS documents has incorporated implementation of the revised standards and guidelines for karst and caves. These revised standards and guidelines protect the function and integrity of the karst systems, rather than individual features. In fiscal year 2000, successful application of LIDAR (Light Distancing And Ranging), high resolution Digital Elevation Models (DEM) and high-resolution orthorectified photographs for feature identification was demonstrated on the Tuxekan and Kosciusko Projects. Recommendation for future project planning includes utilizing LIDAR. This technology generates 10-foot contour DEM model maps. This DEM can be manipulated by software (e.g. Terra Model) that generated and highlighted depression contours. This

process can be utilized to indicate the position of sinkholes, closed basins, insurgences, and resurgences (springs) both through the forest canopy and in the second growth areas. The presence of these features can be verified by air photograph interpretation and field reconnaissance. LIDAR generated DEM's planned for these projects will aid in these inventory efforts.

Continued training and utilization of karst specialists, hydrologists and soil scientists is essential in implementation of the karst and cave standards and guidelines. It is imperative that vulnerability classification of karst lands be conducted before timber harvest is planned. The most sensitive areas or those of high vulnerability should be identified and removed from the suitable lands base before harvest units are proposed. Tongass Forest Land and Resource Plan Implementation policy clarification for karst management standards and guidelines is currently in the review process.

Karst and Caves Effectiveness Monitoring

Evaluation:

Monitoring included only one project that followed interim standards and guidelines for karst and caves, since projects following the karst and cave standards and guidelines in the revised Forest Plan have not been implemented on the ground to date. The monitoring indicates that the interim standards and guidelines for system protection are effective. It is not possible to distinctly determine if the standards and guides for Karst and Caves in the revised Forest Plan are effective until additional monitoring is completed. Preliminary indications are that the karst and cave management standards and guidelines, where fully applied and focused on system protection, are effective in protecting the integrity of significant caves and karst resources.

Only the Heceta Sawfly Salvage Sale Project on Heceta Island was monitored. Heceta Sawfly was a timber sale that implemented interim standards and guides prior to the implementation of the Revised Forest Plan. Additional protection has been placed around several features not discovered during the original unit layout or the re-evaluation. This salvage harvest focused primarily on feature protection. Heceta Island is characterized by catastrophic wind throw events. The effectiveness of the karst standards and guidelines is dependent upon the success of the harvest prescriptions and design and mitigation measures for road construction.

Action Plan:

Preliminary indications show karst and cave management standards and guidelines, where fully applied and focused on system protection, are effective in protecting the integrity of significant caves and karst resources. The minimum standards for karst and cave protection associated with feature protection were implemented in the Heceta sawfly Project area. The effectiveness of the prescriptions and mitigation was demonstrated. Continued monitoring efforts will focus on the success of the prescriptions in those units and the windfirm nature of the remaining forest and associated buffers. Pre-harvest monitoring of caves is significant to determine baseline data on sediment, flow, and windthrow. No pre-harvest monitoring of caves associated with the Kosciusko Island planning effort was conducted due to budget constraints. Inventory and monitoring of the backlog of caves discovered during the past two field seasons is planned for the 2001 field season.

Minerals and Geology

Evaluation:

Active mining operations and non-energy operations were inspected to determine if the effects of the mining activities on surface resources was consistent with the Forest Plan and as allowed in the Plans of Operation. The monitoring included inspection for compliance with agency regulation, review and evaluation of the approved plan of operations and resource protection measures, compliance with State or Federal permits, and compliance with monitoring plans. The specific inspection activities included exploration work sites, reclamation sites, road construction and maintenance, timber removal, public safety, fire prevention, solid waste disposal, and project monitoring. Operators were notified of problems and follow-up action was documented.

Monitoring was completed on 80 percent of the active mining operations, 100 percent of the non-bonded, non-energy sites, and 89 percent of the bonded, non-energy operations. Generally, inspections of mineral activities indicate that the effects of mining and locatable minerals activities on the surface resources are consistent with Forest Plan expectations, environmental analysis, approved Plan of Operations, and permit requirements. Continued emphasis of the minerals specialists' inspection and monitoring is necessary at large operations or at sites where the potential for environmental consequences to soil and water resources are significant.

Action Plan:

Monitoring of the minerals operations showed that this monitoring contributes to ensure protection of the soil and water resources and reduce the potential for significant environmental consequences. The minerals specialists effectively worked with the operators to resolve problems associated with monitoring plans, erosion, and site safety/security and develop associated mitigation plans. Required approval of site operation plans provides the Forest Service the opportunity and authority to control the effects of the development of forest surface resources. Recommendations follow to continue the minerals monitoring program.

Recreation and Transportation

Recreation Off Road Vehicles

Evaluation:

Off Road Vehicle (ORV) impact to the soil productivity and water quality monitoring showed that in general, ORV use is causing neither considerable impact nor adverse effects on soil and water resources on the Tongass. The primary ORV use on the Tongass has been four-wheels and snowmobiles. Snowmobiles generally use forest roads and higher alpine areas although some use was reported in the Stikine-LeConte Wilderness. Use of this equipment is restricted to times when there is adequate snow cover as provided by the Alaska national Interest Lands Conservation Act (ANILCA). Generally the impacts caused from ORV use have been minor damage to wetlands and soil rutting. Some instances of ORV associated impacts were noted in high use areas. In response to these site-specific impacts, the districts have closed some areas where impact to the soil and water resources occurred. The districts worked to educate the public on soil and water resource protection and enforcement to ensure compliance.

Action Plan:

Evaluation of the Off Road Vehicle (ORV) monitoring shows that some impacts to the soil and water resources were reported. Although most of these impacts were minor, increased use of four-wheelers and snowmobiles could significantly increase the effect on the soil and water resources. Continued monitoring of the impacts associated with Off Road Vehicles is recommended. Emphasis should continue on high use areas and focus on evaluation of the wetland and other high sensitive areas. Soil and botany specialists should be involved in these site evaluations. Continued emphasis on education of the public on potential impacts associated with ORV use is essential.

Transportation

Evaluation:

Monitoring of access and travel management effectiveness for protection of soil and water resources, log transfer facility impacts associated with bark accumulation in marine waters and oil pollution, and road impacts associated with water quality was conducted in fiscal year 2000. This monitoring showed the standards and guidelines are effective in limiting environmental effects to anticipated levels. The road impacts associated with water quality were monitored through the BMP implementation monitoring as well as turbidity monitoring that are discussed in the soil and water sections of this report.

The monitoring of access and travel management included inspection and evaluation of the effectiveness of gates and barriers on closed roads. This monitoring was completed utilizing the road condition survey data. Data showed that road closure was effective in most cases: 100 percent on classified and unclassified roads utilizing pulled bridges; 77 percent on classified roads and 79 percent on unclassified roads utilizing pit and mound features. The trenches features on some roads were constructed deep enough to limit vehicular traffic but are still passable by off road vehicles. Modification of these closure features is planned. Contribution to soil erosion and impacts to water quality associated with ORV traffic on closed roads has been minimal. Continuation of the road condition survey process is planned.

Bark accumulation and oil sheen were monitored at log transfer facility sites (LTF) during fiscal year 2000. Documentation on the volume of timber processed through the LTFs was also completed. Bark accumulation monitoring is required under the EPA NPDES permit for LTF sites that transfer more than 15 mmbf during the next 5 years and are located less than 60 feet mean lower low water (MLLW). The bark accumulation data was used to determine compliance with the Alaska State Water Quality Standards for settable residues in marine waters. Preliminary bark monitoring dives and pre-discharge bark surveys were conducted at 34 LTFs in fiscal year 2000. Two of these sites showed bark accumulations that will require additional monitoring. The oil sheen monitoring showed that the daily oil sheen records were completed at each site during operation. Immediately following observation of oil sheen, corrective action was taken and the incidence was reported. These occurrences of oil sheen were minor and corrective action was taken; no impact to soil and water resources resulted.

Action Plan:

Monitoring of access and travel management showed that some of the closure features installed are passable by off road vehicles (ORVs). The closure features on these roads will be modified so the structures are impassable to vehicular traffic as well as ORVs. Monitoring of access and travel management effectiveness is completed through the road condition survey process. The initial survey of the roads on the Tongass is anticipated to be complete in the next few years. Subsequent survey of the some roads will be conducted as changes in the access and travel management occur.

Bark accumulation and oil sheen monitoring provides information significant to determine compliance with the Alaska Water Quality standards for settable residues in marine waters as well as to satisfy requirements for the EPA NPDES permits. This monitoring provides information to evaluate potential impact to water and soil resources. More extensive monitoring will be conducted at the two sites, which show accumulations requiring annual monitoring per regulation. The monitoring of oil sheen is also required by regulation and will continue at all sites during times of operation. The monitoring of bark accumulations and oil sheens will continue in the next fiscal year.

During periods of log transfer operation, receiving waters at the LTF will be visually monitored daily for the presence of an oil sheen. Daily Oil Sheen Logs will be maintained at the Districts. The presence of any oil sheen shall be recorded, with the date, name of observer, cause of source of oil sheen, and corrective measures taken, and will be reported to the Lead Tongass Environmental Engineer. This information will be included in the annual report that is due by January 31 of the year following each calendar year of operation and discharge under the General NPDES Permit.

Objective 1.b

Objective 1.b—Provide ecological conditions to sustain viable populations of native and desired nonnative species and to achieve objectives for Management Indicator Species (MIS)/focal species.

In reference to Objective 1.b, the monitoring completed on biodiversity, fish management indicator species (MIS), endemic wildlife species, and wildlife MIS describe the status of the Forest relative to ecosystem health. Significant issues addressed in the monitoring this year included:

> Maintenance of contiguous blocks of old growth to support viable and well distributed populations of old growth related species.
>
> Effects of biodiversity.
>
> Consistency of management practices with sensitive species conservation.
>
> Population trends for fish MIS related to habitat changes.
>
> Population trends for wildlife MIS related to habitat changes.
>
> Population levels and associated distribution of mammalian endemic species.

Biodiversity, Fish Management Indicator Species, Wildlife Management Indicator Species

Biodiversity

Evaluation:

Monitoring has shown that contiguous blocks of old growth has been maintained in a system of old growth reserves to support viable and well distributed populations of old growth related species. Project level environmental documents and forest plan amendments were reviewed for information on associated effects on the spatial distribution, size, and composition of old growth reserves. A detailed evaluation of the OGR system was completed in 1997 and serves as a benchmark to the conditions of the system at the time the TLMP Revised Record of decision (ROD) was signed. Analysis of old growth reserves (OGR) system concludes that this system is sufficient for evaluation. Monitoring for changes to size and composition of old growth reserves was completed. Since the signing of the TLMP Revision RODs in 1997 and 1999, thirteen environmental documents have changed the size or composition of the old growth reserves. The old growth habitat land use designation (LUD) has increased in size since the signing of the1997 ROD; increasing 12,441 acres now containing 4,944 more acres of productive old growth. Old growth habitat reserves modified during fiscal years 1998 – 2000 exceeded productive old growth requirements. Project level decisions have generally increased the size and improved composition of old growth reserves.

The amount of timber harvest is used as an indicator of the effects on biodiversity. Biodiversity analysis completed for the Forest Plan assumed that the amount of timber harvest is an index of potential effects on biodiversity. The harvest units were tracked through GIS by province and volume strata. The acres of productive old growth (POG), treated by some type of timber harvest method, were tracked and summarized by ecological province. Forest Plan biological analyses assume the maximum level of timber harvest will be achieved. The annual harvest levels of POG in the past three years have been significantly lower than the predicted levels. The magnitude of timber harvest and the potential impacts on biodiversity have been less than those forecasted in the Forest Plan.

Biodiversity monitoring also focused on evaluation of management practice consistency relative to the current knowledge about sensitive species. The monitoring was conducted by analysis of four sampling efforts:

> Annually review [Forest Service] files and recent information regarding sensitive species taxa on the Tongass National Forest.
>
> Consult with other agencies regarding [management practices for] these species and whether additional species should be considered for addition to the Region 10 sensitive species list" (Forest Plan page 6-5). Summarize the results of any consultations with ADF&G and USFWS under the MOU with those agencies.

Evaluate data collected in studies to determine the need for changes in the standards and guidelines of the Tongass Land Management Plan.

Summarize results of Biological Evaluations [BE's] and associated effectiveness monitoring conducted at the project level.

The monitoring regarding sensitive species showed no formal evidence of need for revision of the Regional Forester's sensitive species list. No new information was collected in fiscal year 2000 that was inconsistent with the standards and guidelines and LUDs of the Forest Plan. No standardized protocol was utilized for the survey of any of the T&E or sensitive species for application to biological assessments and biological evaluations. No standardized protocol was utilized for the survey of site locations. The letters from other agencies contained pertinent comments regarding sensitive species. Evaluation of the standards and guidelines showed that changes are indicated for the American marten and these changes may potentially affect sensitive species. A need to change the standards and guidelines was also recommended to modify the even distribution of partial harvesting within units. No project level effectiveness monitorlng was conducted in fiscal year 2000.

Action Plan:

Monitoring of the contiguous blocks of old growth has shown that they have been maintained in a system of old growth reserves to support viable and well distributed populations of old growth related species. The 1997 evaluation of the OGR system is still valid; no additional analysis system is needed at this time. Recommendations include continuing to review and modify OGRs during project level planning. Emphasis is placed on tracking changes in OGRs through the environmental document process utilizing GIS. Recommendations follow to maintain a GIS LUD coverage for each year.

The potential effects on biodiversity were inferred from the amount of timber harvest. The acres of productive old growth (POG), treated by some type of timber harvest method, were tracked and summarized by ecological province. Recommendations for future analysis of the effects on biodiversity include continuing to apply the assumption from the Forest Plan analysis that the amount of timber harvest is an index of potential effects on biodiversity. Emphasis for work next fiscal year is focused to continue progress on constructing existing vegetation maps for forest structure. Recommendations also include further developing a GIS mechanism to track partial cutting separate from clear-cut.

Evaluation of management practice consistency relative to the current knowledge about sensitive species shows no need expressed formally for revision of the Regional Forester's sensitive species list at this time. Consideration should be given to re-evaluate the list relative to the extensive amount of additional land protected since development of the list. The Tongass Forest Plan standards and guidelines for sensitive species generally appear adequate. However, a mechanism needs to be found to apply the marine mammal disturbance standards and guidelines to non-Forest Service personnel and vehicles but are not under the direct supervision of Forest Service personnel (e.g., log rafts under tow). The design of the partial harvest standards and guidelines for goshawks and marten should perhaps be reconsidered. Any analysis completed should fully consider that the existing standards and guidelines call for a fairly even distribution of the leave trees. Potentially, this might be the best system for the majority of rainforest forest biota as well as best for the long-term ecological function of the stand many decades into the future. For BE's and BA's, Tongass biologists need to consider the most recent list of T&E species as provided by the NMFS and the USFWS. Forest biologists and botanists need to assure consistency. Continued emphasis needs to be placed on description of logic and survey results for the determinations.

Fish Management Indicator Species

Evaluation:

Fish Management Indicator Species (MIS) monitoring included progress on protocol development for the anadromous and resident fish MIS. Work continued to develop a synthesized approach for all aspects of fish habitat monitoring. A technical team of Forest Service specialists and an advisory team of employees from the cooperating agencies continued to meet and a plan for synthesizing the aquatic monitoring was developed.

A full monitoring program for trends in the populations of resident cutthroat trout and Dolly Varden char and their habitat was initiated following successful completion of pilot monitoring in 1999. The full program focused on locating additional streams meeting the specific criteria identified in the monitoring protocol and making population estimates and completing Tier 3 habitat surveys in as many streams as possible. The protocol incorporates a design that requires monitoring streams before and after timber harvest. Some streams were sampled for the second year in this long-term program while others were sampled for the first time.

The resident fish protocol was applied to monitor resident fish populations for cutthroat trout and Dolly Varden. At the end of the 2000 field season, 19 streams across the Tongass National Forest were identified and field-verified that meet the selection criteria specified in the monitoring protocol. Additionally, three streams have been identified above barriers with resident fish and but with no planned future logging. These streams will serve as controls.

During the last two years, population estimates for resident cutthroat and Dolly Varden have been completed in 14 treatment streams and for six of those streams we now have two years of population data (Table 2). Population estimates have been completed in two control streams and we have two years of data for one of those. Of the 16 streams sampled for fish populations, eight have both cutthroat and Dolly Varden, four only cutthroat, and four only Dolly Varden. The estimated number of cutthroat and Dolly Varden varied widely among the sampled streams.

The removal method population estimates were not possible in two instances as the final catch increased substantially from the first or second catches. We believe this is a random error caused by the low number of fish of that species in those streams. Generally the 95 percent confidence intervals around the estimated number of fish are narrow and evaluation shows the results of the population sampling are generally consistent.

No trend analysis of the data is appropriate at this time. Potential trends in fish populations and habitat features due to forest management will only be possible following collection of several years of pre-harvest and post-harvest data. Several areas within the same watersheds as the monitored streams may be harvested as soon as 2001 and most are scheduled for harvest within the next three years. The protocol recommends allowing two years following timber harvest before beginning to sample the fish populations to allow for potential response from logging. As planned, the first post-harvest sampling will occur in 2004.

Action Plan:

Year 2000 was the first year for a full resident fish MIS monitoring program. A pilot run in 1999 was successful and the IMEG decided to move to full implementation of the protocol. A major goal for the year was to increase the number of monitoring streams and to broaden the distribution of the streams to include more of the districts with a timber harvest program. This goal was achieved.

Control streams were added to the design this year following a recommendation from the IMEG. Control streams are not required for the pared-t test, but will help to explain changes in the fish populations that might not be related to timber harvest. We plan to focus our resources on adding more treatment streams, but will also include controls where possible.

Considering the resident fish work for next fiscal year, we plan to continue our work with population estimates completed by District and SO employees. Two experienced teams have been identified to complete all the habitat surveys, in order to increase consistency. Completing the habitat surveys has been less successful than completing the population estimates. This probably occurred since the population work is spread among many district biologists and the habitat work was concentrated on fewer individuals with existing workloads. We hope to hire a person to focus on habitat surveys for next year.

Progress was made in developing monitoring protocols for coho and pink salmon MIS and this work is planned to continue in the next fiscal year. The Forestry Sciences Laboratory, working with the Alaska Department of Fish and Game, has prepared a proposal to develop a protocol that will include annual monitoring of the number of coho smolts migrating from one or two medium-sized watersheds.

Additionally, juvenile coho populations and habitat will be monitored in tributary streams subject to variable logging strategies.

For pink salmon, we will initiate review of spawning escapement data that has been collected in over 700 watersheds over the last 30 years and timber harvest history for the same watersheds. If trends are detectable in the existing data, we plan future monitoring to see if trends in pink salmon are also evident with logging conducted under the current standards and guidelines. If trends between logging and pink salmon escapement are not evident in the older data, we probably will not spend the resources to monitor for potential effects of future logging.

Kuiu Island has been selected as a pilot for review of the existing pink salmon escapement and logging history data. Eighty-one streams have been identified for Kuiu that have long-term escapement records and a strategy has been developed to quantify the logging history for each watershed. We are currently attempting to link the watersheds with escapement data to the Forest Service GIS covers to run the past timber harvest queries.

Wildlife Management Indicator Species

Evaluation:

Since the signing of the 1997 ROD, we concluded that the list of wildlife MIS needed to be updated and that current TLMP wildlife monitoring questions are too broad to develop useful monitoring protocols (DeGayner et al 1999). We also recognized that the methods for monitoring the MIS, such as reviewing harvest statistics, were not adequate and that more complete monitoring protocols needed to be developed.

The number of wildlife MIS was recommended to be reduced from 13 species to 6 species. The goshawk, Alexander Archipelago wolf, Sitka black-tailed deer, American marten, brown bear, and northern flying squirrel were selected as potential Management Indicator Species (MIS) for monitoring protocol development. These species were selected because they played a key role in the development of the old-growth conservation strategy and other wildlife conservation measures implemented in the Tongass Land Management Plan (TLMP) (DeGayner et al. 1999). However, this recommendation is contingent on interagency agreement that credible and cost-effect monitoring plans can be developed for the species.

We proposed that the updated list of MIS (DeGayner et al. 1999) and current TLMP wildlife monitoring questions (USDA Forest Service 1997) to be reframed to more tightly tie them with management issues. The monitoring questions need to be linked with potential environmental "stressors" (i.e., management activities) and in turn links "stressors" of ecosystem integrity with potential MIS species. As described by Noon et al. (1997), "indicators" of the ecological stress are aspects of the biology of the species that can be measured and are influenced by the anthropogenic stressor. MIS task groups will identify the actual "indicators" -- the actual parameters to be measured during monitoring to evaluate the species model. Potential indicators include parameters such as population density, abundance, site fidelity, reproductive rate, mortality rate, home range size, population structure, and so forth. The species-specific task groups are to select indicators based on their apparent demographic significance and strength of tie to the ecological stressor, along with the potential to compare (at a reasonable cost) indicator measurements between landscapes that have been treated differently.

In fiscal year 2000, a species task group was established for each of the six recommended MIS. These groups are charged with developing monitoring plans to evaluate how well conservation measures in TLMP protect MIS habitat and populations. Specifically, the task groups are working to develop a strategy to evaluate whether population trends for Management Indicator Species and their relationship to habitat changes are consistent with expectations in TLMP. To this end, task groups are working to review key assumptions about MIS habitat needs used during the development of TLMP. The task groups are to take a strategic look at how to integrate, if desirable, existing monitoring into their monitoring strategy/plan. The team's recommendation will be influential in determining the future course of these studies.

Task groups are to develop a habitat model or other relevant model (e.g., effects of road access) for how their MIS is influence by TLMP. The next step is to design studies that test key assumptions of the model using an approach similar to the one outlined by Mulder et al (1997). This approach requires: 1) specifying goals, 2) identifying stressors, 3) developing a conceptual model, 4) selecting indicators, 5) establishing sampling design and 6) defining response criteria while ensuring a linkage to decision-making during all steps.

The monitoring plans will differ depending the forest management issue, past studies, and ongoing work on the species. In cases where conservation assessments are available and administrative studies and monitoring activities are ongoing, such as the goshawk (Iverson et al 1996) and wolf (Person et al 1996), the monitoring plans may provide additional synthesis. In any case, they may help chart future activities. The plans will determine if existing work is meeting Forest Service needs by formalizing the strategic plan to monitor these species. For species where less is known, such as the flying squirrel, more time may be spent developing a conceptual plan and evaluating what types of information are needed to monitor the species.

To address these management questions and trends in MIS habitat/populations interagency species-specific task groups are to develop formal monitoring protocols in FY 2000. In meantime, the Forest Service is supporting several monitoring activities and administrative studies that we believe that will be useful for addressing these issues. Table 3.1 summarizes these activities.

Table 3.1 FY 1999 and 2000 monitoring activities other than task group protocol development

MIS Candidate Species	FY 1999and00 Monitoring Activities conducted by the Forest Service	Activities by others likely to contribute to Long-term monitoring efforts.
Black-tailed Deer	1) AD&G and FS conducted annual pellet count surveys. 2) Mitkof Islands habitat use study and model habitat model review. 3) Level Island deer model review	ADF&G Heceta deer/wolf study (in 4th year).
Wolf	1) Established 4-yr Challenge Cost Share Agreement with ADF&G to study deer/wolf interactions and wolf biology. 2) Pilot project with Petersburg ADF&G to estimate wolf numbers and movements.	ADF&G Heceta deer/wolf study (in 4th year). Contact: Dave Person/Chris Farmer.
Flying Squirrel	1) FSL flying Squirrel study on POW island completes 2nd year. 2) Mitkof Island flying squirrel Den Study (final year, report spring 2000) Contact K. Hastings, D. Magnuss, V. Bakker)	Flying Squirrel Taxonomy in SE AK. (Joe Cook at U of AK, Fairbanks).
American Marten		ADF&G analysis of marten data from NE Chichagof Island.
Northern Goshawk	1) Annual nest monitoring conducted by ADF&G and FS. 2) FS and ADF&G entered into a agreement to update the Conservation Assessment for the Northern Goshawk in SE AK (Iverson et al, 1996) with new information.	
Brown Bear		ADF&G analysis of brown bear data on Chichagof Island.

Action Plan:

Work is anticipated to continue toward update of the Wildlife MIS list to reduce the number of recommended species for monitoring. These recommended species include goshawk, Alexander Archipelago wolf, Sitka black-tailed deer, American marten, brown bear, and northern flying squirrel. Recommendations follow to reframe the current TLMP wildlife monitoring questions to more tightly tie them to management issues. MIS task groups will continue to work to develop monitoring protocols that will identify the actual "indicators" -- the actual parameters to be measured during monitoring to evaluate

the species model. Potential indicators include parameters such as population density, abundance, site fidelity, reproductive rate, mortality rate, home range size, population structure, and so forth. The species-specific task groups are to select indicators based on their apparent demographic significance and strength of tie to the ecological stressor, along with the potential to compare indicator measurements between landscapes that have been treated differently.

Planning Regulations (36 CFR 219.19 (a)(6)) direct that "Population trends of MIS will be monitored and relationships to habitat changes determined." Population trends may be inferred using species-habitat relationships information. This approach involves inferring population trends from trends in amount and condition of habitat over time, based on known relationships between species and habitat.

The following are the Wildlife MIS proposals, for which funding was authorized on March 1, 2001. In addition to this list, funds were allocated toward participation on the conservation strategy. The evaluation criteria used to select projects included:

1. Grounded in task group reports of 2000.

2. Current interagency agreement (as per Gene DeGayner's summary of his February 2001 contacts with ADF&G, and Larry Meshew's contacts on 2/28 and 3/1 with Kim Titus, Chris Iverson and Teresa Woods).

3. Need for brown bear monitoring.

4. Helps to determine whether the species would be a good long-term indicator species; or helps to resolve questions over assumptions in the Forest Plan.

5. IM funding should go to projects that are truly monitoring or administrative studies, and should not be used for research.

Table 3.1a – Wildlife MIS Projects Funded for Monitoring in FY 2001 (as of March 2, 2001)

$29,000 for WL Task Group Reports and WL MIS Planning

About $18,000 was already spent on these efforts as of February 10, 2001.

$5,000 for Tongass Support of Study of Ecological Relationships of Wolves, Deer and Habitat

In September 1999, $335,000 of Tongass NFIM funds were obligated for direct support of this ADF&G study. This additional $5,000 is for FY01 logistical support, and support by Tongass WL Bios to this ADF&G study on POW Island.

$3,000 for Participation in Interagency Review of Existing Deer Model

The portion of time expended by Tongass WL Bios.

$3,000 for Evaluation of the Utility of a Nutritionally Based Model for Deer Habitat

Tongass WL Bios participate in SEALASKA review of deer use of young growth.

$3,000 for Report on DNA Markers as a Tool to Estimate Deer Populations

Field sampling and expensive genetics work were completed on regular wildlife funds of Tongass NF. The report needs to be written by Thorne Bay WL Bio.

$60,000 for Satellite Transmitters for Home Range and Survival Data on Ten Goshawks

This project funds ADF&G to buy and mount transmitters on five pairs of goshawks. The purpose is to sample the true size of breeding season home ranges and the annual survival rate(s) of adults, for which aerial radio-telemetry has proven inadequate. Birds will be those with existing aerial-telemetry radios as well as those found during annual nest monitoring, with emphasis on goshawks in landscapes with the most past and future timber harvest. The most emphasis will be where adjacent pairs of goshawks are located.

$20,000 for Wrangell RD WL Bios and Techs to Search Among Known Pairs for Adjacent Pairs

$21,000 to Locate Past Kills of Brown Bears and Model Where Bears are Most Likely to be Killed.

ADF&G staff would create a GIS coverage of all brown bear mortalities in Southeast Alaska since 1960 based on sealing records. Those locations would be related to landscape features such as boat anchorages, roads, other human activities, topography near the beach, and salmon streams to build a model of areas where bears are likely to be killed. This model could be used to identify areas where future hunting pressure may increase and where human development or activity is incompatible with habitat needs of brown bears.

$20,000 to Consider Brown Bears where They are Sparse, in Units 1 and 3.

The Unit 4 Interagency/Public Task Group for the Brown Bears of Unit 4 did an excellent job at identifying brown bear problems and important studies and monitoring for Unit 4. In many cases, the very same concepts apply to Units 1 and 3. However, brown bears tend to be dense in Unit 4, and sparse in Units 1 and 3. Where sparse, brown bear population health may be more susceptible to certain activities than where bears are dense: direct bear viewing; inadvertent disturbances such as boats moored in estuaries during periods when critical for brown bears; defense of life and property kills; and outfitter and guide effects. This funding is for Tongass WL Bios and their per diem ($8,000), as well as USFS aircraft to transport Tongass Bios and ADF&G Bios together to the field ($12,000). The interagency group will discuss situations where brown bears are sparse, as well as how to monitor the bears or the human activities. The results will be used to modify the November 2000, draft Tongass Brown Bear MIS Report.

$47,000 for a Second Year of Demographic Data on Flying Squirrels, where Red Squirrels Exist

While three years of data exist on flying squirrels from six study plots on POW Island where no red squirrel exists, flying squirrels may be sparser and reproduce less where red squirrels exist. This funding permits the FSL to resample their two flying squirrel grids on Mitkof Island. A second year of data where red squirrels exist, would allow a much more meaningful analysis of flying squirrel demographics and habitat needs.

$211,000 = Total IMMC74 Costs for Wildlife MIS Projects

2004 Forest Plan Review: Wildlife MIS

The five-year Forest Plan Review will address economic, social, wildlife, fisheries, and other resource issues and identify potential mid-course corrections in the management direction within TLMP. The Forestry Sciences Lab, in an interagency fashion, will lead these analyses. The lab will ask the following questions: Are the management strategies meeting plan objectives; are the assumptions under which the plan was developed still valid; is there new information that would question the ability of the plan to achieve objectives?

This section defines the role and scope of MIS monitoring as it pertains to the five-year Forest Plan Review. MIS monitoring is designed provide information in support of the evaluation of the conservation strategies, but a larger “bigger picture” approach is needed to actually evaluate the conservation strategies. Evaluating effectiveness of the conservation strategy is a task that would likely never be assigned to any one research or monitoring project. It is an undertaking that would cross disciplinary boundaries. Such an undertaking clearly falls into the domain of synthesis and is larger in scope than MIS monitoring. For example, the evaluation the efficacy of 1000foot beach buffers may require information on flying squirrel dispersal patterns, goshawk habitat selection, and efficacy of management practices in the adjacent matrix lands.

Collectively, findings from MIS monitoring, other monitoring analyses, new scientific literature, and administrative studies will feed into workshops and other synthesis efforts to evaluate the management strategies within TLMP.

Objective 1c.

Objective 1.c—Increase the amount of forests and grasslands restored to or maintained in a healthy condition with reduced risk and damage from fires, insects and diseases, and invasive species.

In reference to Objective 1.c, the monitoring completed on biodiversity describe the status of the Forest relative to ecosystem health. Significant issues addressed in the monitoring this year included:

> Destructive insect and disease organism status relative to increases to potentially damaging levels following management activities.

Biodiversity

Evaluation:

Most occurrences of insect and disease are natural and considered a part of, and contributing factor to ecosystem diversity. Endemic levels of insect and disease activity are usually allowed to run their course. Heart rot decays are a key agent causing small-scale disturbance in the Forest resulting in bole breakage in older trees. Average defect in late seral stands is approximately 1/3 of gross volume. The incidence of decay is significantly related to tree age. Hemlock and spruce less than about 100 years of age are generally sound. Older hemlock deteriorates at a faster rate than Sitka spruce. Based on research by James Kimmey, for Sitka spruce in age class 151 to 200, defect was 5 percent, while in hemlock it was 16 percent (Farr, 1976). At 300 to 400 years of age, spruce is relatively rot free, whereas decay in hemlock averages 30-40 percent on a board-foot basis (Farr, 1976). Research by Kimmey (1956) also indicates that volume losses are small in young trees.

As for forest insects, trends in population are generally linked to weather conditions as opposed to forest management practices. The annual pest survey will help to identify where mortality has most recently occurred so that trees could be harvested before they decay. Only 109 acres were mapped on the Tongass National Forest in 2000.

In general, current management reduces the incidence and severity of insect and disease occurrence by removing infected trees through timber harvest. Even-aged vegetation management (clearcutting, seed tree or shelterwood regeneration methods) removes defective trees with fungal infections or those with mistletoe. The TLMP estimated that approximately 80 percent of future harvests will use the even-aged system. Past management has been above this level. The young growth that results after an even-aged harvest is vigorous and usually decay-free.

Action Plan:

The most important diseases and natural declines on the Tongass National Forest in 2000 were wood decay of live trees, hemlock dwarf mistletoe, and yellow-cedar decline. Heart and butt rot fungi cause substantial decay in late seral spruce-hemlock forests. No serious insect or disease in young-growth stands was detected through monitoring efforts. The monitoring work conducted annually by the State and Private Forestry branch of the U.S. Forest Service, Forest Health Group and the Forest Silvicultural staff is adequate.

Monitoring and inventorying insect and disease organisms takes place through efforts of the Forest Service State and Private Forestry, Research, and the National Forest System. Before a harvest prescription is developed, Forest silvicultural staff survey insect and disease conditions. Following harvest, on-the-ground inspections are conducted to monitor stand development. At a minimum, inspections occur 3 to 5 years after harvest and again 12 to 20 years after harvest. These inspections include identifying insect and disease conditions and treatment needs to improve forest health.

Currently the Forest Service is exploring alternatives to clearcutting where portions of the stand, either as single trees or groups of trees, are left as legacy (residual) trees. Questions have been raised as to whether increased blowdown and increased insect and disease damage will occur due to bole wounding of residual trees and/or retention of mistletoe and other infestations within the stand. These questions will be studied in a series of three research installations across the Tongass National Forest. Results of these studies will not be available for three to five years.

Goal 2: Multiple Benefits to People

Provide a variety of uses, values, products and services for present and future generations by managing within the capability of sustainable ecosystems.

Objective 2.a—Improve the capability of the Nation's forests and grasslands to provide diverse, high-quality outdoor recreation opportunities.

Objective 2.b—Improve the capability of wilderness and protected areas to sustain a desired range of benefits and values.

Objective 2.c—Improve the capability of the Nation's forests and grasslands to provide desired sustainable levels of uses, values, products, and services.

Objective 2.d—Increase accessibility to a diversity of people and members of underserved and low-income populations to the full range of uses, values, products, and services.

Objective 2.e—Improve delivery of services to urban communities.

The Tongass achieved these objectives through monitoring several issues that overlap some of the various objectives. The monitoring completed to accomplish the objective is listed respectively. Detailed summary evaluation and action plan associated with the monitoring issues will be summarized under only one objective.

Objective 2.a

Objective 2.a—Improve the capability of the Nation's forests and grasslands to provide diverse, high-quality outdoor recreation opportunities.

In reference to Objective 2.a, the monitoring completed on recreation and tourism, and wild and scenic rivers describe the status of the Forest relative to multiple benefits to people. Significant issues addressed in the monitoring this year included:

Management of Forest relative to the prescribed Recreation Opportunity Spectrum classes.

Implementation of Wild, Scenic, and Recreational River standards and guidelines.

Effectiveness of Wild, Scenic, and Recreational River standards and guidelines.

Recreation, Wild and Scenic Rivers

Recreation Opportunity Spectrum

Evaluation:

The recreation monitoring of the Forest showed that generally the areas on the Tongass are being managed in accordance with the Recreation Opportunity Spectrum (ROS) classes as described in the standards and guidelines. The monitoring primarily focused on sites of existing recreation facilities and areas of traditional high-use, although some monitoring of remote sites was accomplished. The outfitter/guide special use permit records along with records of guiding activity helped to define the high commercial use areas. Monitoring was also completed during the coarse of completing condition surveys for trails and developed recreation facilities, and completion of assessments for environmental documents.

Monitoring use at cabins and other developed recreation sites indicates that the typical visitor experience is within the social, physical and managerial setting described in the ROS classes. Petersburg Ranger district analyzed five timber sales during the planning processes for ROS changes. The anticipated changes from Primitive or Semi-primitive Roaded ROS settings are compatible with the land use designations. Changes in ROS also occurred in two other areas of this district as anticipated through previous NEPA documents.

Several sites on the Sitka, Hoonah, Juneau Ranger Districts and Admiralty National Monument have been identified as sites where there are ROS concerns. The situations at these sites involve potential

conflicts with users on ROS prescriptions and use levels that are higher than prescribed by the ROS class. The issue of potential conflicts for these districts is being addressed this year in the Shoreline Analysis EIS. The implementation of the decision may reduce the impacts of some uses in some specific locations. Other perceived conflicts with the prescribed ROS class have been reported at some locations where use on waterways and over-flights may effect the Forest user's experience. Although this perceived conflict has been reported, the use on waterways and over-flights is outside the jurisdiction of the Forest.

Action Plan:

The recreation monitoring of the Recreation Opportunity Spectrum (ROS) classes will continue. The monitoring will continue to primarily focus on sites of existing recreation facilities and areas of traditional high-use although some monitoring of remote sites is also planned. Emphasis will be placed on monitoring sites where potential conflicts with users or ROS were reported and monitoring needs were identified. The outfitter/guide special use permit records along with records of guiding activity will continue to be used to define the high commercial use areas. Monitoring will also be completed during the coarse of completing condition surveys for trails and developed recreation facilities, and completion of assessments for environmental documents. Changes in ROS will be evaluated relative to land use designations (LUDs) and NEPA.

<u>Wild and Scenic Rivers</u>

Evaluation:

Monitoring completed on the Tongass showed that the standards and guidelines are being implemented and effective in maintaining the free flowing conditions and outstanding remarkable values for eligible rivers. Monitoring activities included monitoring visitor use, outfitter/guide use, compliance of a recreation project within a river corridor, and analyzing projected effects from a proposed timber harvest. This monitoring showed that existing use on the Hasselborg, King Salmon, Katzehim, Blind, Kegan, Essowah Rivers and Anan Creek are within the allowable standards and guidelines recreational outstanding remarkable features and are being effectively managed. Specific visitor data at recreation sites along the Blind River associated with the Blind River Rapids Trail, Blind Slough Picnic Area, Man-made Hole Picnic Area, and other sites along the river corridor is being collected for information to quantify trends. Detailed information was collected in monitoring the Anan Creek Bear Observatory specific to public viewing, outfitter/guide use and bear behavior. Monitoring of this site shows that the recreational use is consistent with the anticipated use in the Anan management Standards Environmental assessment. Ongoing NEPA work addresses effects on the recommended wild, scenic and recreational rivers. Analysis completed for the Overlook, Fanshaw, and Douglas timber sale projects anticipate no effect to the outstanding remarkable values for the rivers.

Effectiveness monitoring focused on the Blind River. This river corridor was enhanced through construction and reconstruction of two trails to fully assessable standards. Management in this corridor included closing a boat ramp to trailer launching during periods of high use and closing a section of the river for motorized use for wildlife protection. The over-wintering habitat for trumpeter swans provided by the Blind River is one of the high wildlife values in this corridor. Winter recreation including ice skating, snow mobiles, and cross country skiing is popular in the river corridor since there is easy access to this site from Petersburg. Potential effects from the location of a proposed State ferry terminal are being analyzed. The location of this ferry facility could change the recreational use patterns and levels in the river corridor.

Action Plan:

Monitoring of the standards and guidelines relative to implementation and effectiveness in maintaining the free flowing conditions and outstanding remarkable values for eligible rivers will continue. Monitoring activities will continue to include monitoring visitor use, outfitter/guide use, compliance of recreation projects within river corridors, and analyzing projected effects from proposed timber harvest. Specific visitor data will continue to be collected at recreation sites along the Blind River corridor for information to quantify trends. Detailed information will continue to be collected in monitoring the Anan Creek Bear Observatory specific to public viewing, outfitter/guide use and bear behavior. Monitoring of this site will

provide information to evaluate the recreational use consistency with the anticipated use in the Anan management Standards Environmental assessment. Ongoing NEPA work is anticipated to continue to addresses effects on the recommended wild, scenic and recreational rivers.

Effectiveness monitoring will continue to include focus on the Blind River. This monitoring will follow up on the enhancement of the fully assessable trails. Monitoring of the boat ramp closure to trailer launching during periods of high use and river section closure for motorized use for wildlife protection will continue. Winter recreation will be monitored for effects to the corridor relative to the standards and guidelines. Potential effects from the location of a proposed State ferry terminal will continue to be analyzed and a monitoring plan will be developed.

Objective 2.b

Objective 2.b—Improve the capability of wilderness and protected areas to sustain a desired range of benefits and values.

In reference to Objective 2.b, the monitoring completed on wilderness describes the status of the Forest relative to multiple benefits to people. Significant issues addressed in the monitoring this year included:

Implementation of Wilderness standards and guidelines.

Effectiveness of Wilderness standards and guidelines.

Wilderness

Wilderness Implementation and Effectiveness

Evaluation:

Monitoring showed that standards and guidelines for Wilderness are generally being implemented and are effective. Specific monitoring activities were conducted on the Admiralty National Monument/ Kootznoowoo Wilderness, South Prince of Wales Island Wilderness, Tracy Arm-Fords Terror Wilderness, Chuck River Wilderness, Endicott Wilderness, Misty Fiords Wilderness, Petersburg Creek-Duncan Salt Chuck Wilderness, South Baranof Wilderness, and Stikine-LeConte Wilderness. This monitoring was employed various methodologies. An ecosystem approach used on the Misty Fiords Wilderness provided a collection of broad-scale observational data that can be used to identify resource related trends and concerns. Monitoring of the standards and guidelines is supported through repeated observation and documentation. Baseline inventory data is essential to monitor standards and guidelines.

Results indicate monitoring is essential to provide information on the status of wilderness management relative to standards and guidelines. Information on several heritage sites was collected during the monitoring effort. Compliance of outfitter guides operating in the wilderness to the standards and guidelines is required by permit. Implementation and effectiveness of these standards and guidelines was confirmed through monitoring. We completed some plant inventory documentation of threatened, endangered and sensitive plants as well as non-native plants. Specific emphasis needs to be placed on collecting baseline inventory data on threatened, endangered and sensitive plants as well as non-native plants in wilderness areas. Monitoring also highlighted the need for cabin and trail maintenance on some of the districts. Concerns on levels of use, noise and visual impacts that affect the wilderness solitude were identified in some specific areas. Additional monitoring is needed to quantify use levels, and associated mitigation measures should be developed as needed. Noise impacts reported on the Admiralty National Monument, Juneau Ranger District and Ketchikan/ Misty Ranger District were caused by motorized boat and air traffic outside the jurisdiction of the Forest Service. These impacts affect the wilderness solitude, remoteness and sense of isolation of the wilderness.

Action Plan:

Monitoring the implementation of standards and guidelines for wilderness will be continued. Specific monitoring activities will continue on the Admiralty National Monument/Kootznoowoo Wilderness, South Prince of Wales Island Wilderness, Tracy Arm-Fords Terror Wilderness, Chuck River Wilderness, Endicott Wilderness, Misty Fiords Wilderness, Petersburg Creek-Duncan Salt Chuck Wilderness, South Baranof Wilderness, and Stikine-LeConte Wilderness. Monitoring of standards and guidelines is supported through repeated observation and documentation. Monitoring conducted using standard protocols and scientific methods needs to be employed. Application of monitoring protocols and further refinement of the standards will continue. Emphasis will be placed on collecting baseline inventory data. Focus of this information collection will be to fill data gaps such as the threatened, endangered and sensitive plant inventory, and in some wilderness areas. Monitoring of the invasive non-native plant in the Petersburg Creek-Duncan Salt Chuck Wilderness needs to be continued and evaluation of the potential effects to the threatened, endangered and sensitive plants needs to be completed. Additional focus will be placed on monitoring levels of use and quantifying the monitoring data. Following data evaluation, mitigation measures associated with use will be developed. Conflicts associated with the wilderness objectives of solitude and primitive recreation and aircraft overflights, boat traffic, and dock construction will continue to be addressed through interagency collaborative planning.

Objective 2.c

Objective 2.c—Improve the capability of the Nation's forests and grasslands to provide desired sustainable levels of uses, values, products, and services.

In reference to Objective 2.c, the monitoring completed on heritage resources, land management planning, local and regional economies, recreation and tourism, scenery, subsistence, timber, wild and scenic rivers, wilderness, and cost and outputs describe the status of the Forest relative to multiple benefits to people. Significant issues addressed in the monitoring this year included:

Implementation of heritage resource standards and guidelines.

Effectiveness of heritage resource Standards and guidelines in protecting resources.

Consistency of land management planning with management objectives of adjacent lands (discussed in Objective 2.d.).

Effects on employment and income (discussed in Objective 2.d.).

Management of Forest relative to the prescribed Recreation Opportunity Spectrum classes (discussed in Objective 2a.).

Effectiveness of attaining the Visual Quality Objectives.

Consistency in effects of Forest Management relative to subsistence users with anticipated effects.

Implementation of timber harvest standards and guidelines.

Restocking of harvested Forest lands five years following harvest.

Consistency of Timber Allowable Sale Quantity.

Consistency of the non-Interchangeable Components (NIC) of the allowable sale quantity with actual harvest.

Proportional mix of timber volume in NIC I and NIC II relative to Forest Plan estimates.

Effectiveness of maximum size limits for timber harvest areas.

Implementation of Wild, Scenic, and Recreational River standards and guidelines (discussed in Objective 2.a.).

Effectiveness of Wild, Scenic, and Recreational River standards and guidelines (discussed in Objective 2.a.).

Implementation of Wilderness standards and guidelines (discussed in Objective 2.b.).

Effectiveness of Wilderness standards and guidelines (discussed in Objective 2.b.).

Outputs produced by the Forest (discussed in Objective 2.e.).

Heritage Resources

Heritage Implementation and Effectiveness

Evaluation:

Monitoring shows Forest Plan standards and guidelines are being implemented. Some of the monitoring work was completed through a Programmatic Agreement (PA) with the Advisory Council on Historic Preservation and the Alaska State Historic Preservation Officer. The PA formalizes our compliance with Section 106 of the NHPA and includes site and project monitoring standards. The PA expired September 30, 2000 and we are currently negotiating terms of a new PA that incorporates 1992 amendments to the NHPA (codified by new rules published at 36 CFR 800). One of the most notable regulatory changes is an enhanced role of Indian Tribes in the Section 106 consultation process.

Evaluation of 76 undertakings were completed in fiscal year 2000 for their potential to affect heritage resources eligible to the National Register. The standard consultation procedures outlined in 36 CFR 800 were followed for five undertakings (less than 7 percent of all reviewed projects) prior to the signing of a

NEPA decision memo. For the remaining 71 projects, we followed modified consultation procedures outlined in the PA with the Alaska State Preservation Officer (SHPO) and the Advisory Council on Historic Preservation. Avoidance of adverse effects is the preferred mitigation option for heritage resources on the Tongass National Forest. During fiscal year 2000 no projects required mitigation other than avoidance.

Monitoring included condition assessment of heritage sites on 138 sites. Archaeologist noted accelerated erosion at eight sites and evidence of human caused damage at six sites. The remaining 124 sites are in a state of natural decomposition. No damage resulting from Forest Service projects was reported. Generally, the Tongass met our legal compliance requirements and completed heritage resource affects analysis prior to making a NEPA decision.

Public outreach and other enhancement activities are perhaps our best tools in protecting heritage resources for future generations. The Tongass National Forest has a strong public outreach program that advocates forest visitors take an active stewardship role. Passport In Time (PIT), a popular national program, offers the public opportunities to work with archaeologists on a variety of projects. Volunteers participated in several Tongass PIT projects during 2000, including several heritage resource site-monitoring projects.

Action Plan:

The USDA Forest Service - Alaska Region has developed heritage resource management procedures to efficiently and economically carry out its obligations under Sections 106 and 110 of the National Historic Preservation Act. These procedures are outlined in a programmatic agreement that is currently being revised. Archaeological inventory is prioritized by the likelihood of locating heritage resource sites. Archeological inventory for proposed activities will continue to be concentrated primarily in the high sensitivity zones. Post-project monitoring on roads and within other activity areas will continue to be accomplished to verify the assumptions of the sensitivity model and to determine whether heritage resources are present but not revealed by standard inventory techniques.

The Forest Service should continue heritage resource monitoring to ensure that Forest Plan standards and guidelines are continually met. In the past three years we have made significant progress in implementing standard monitoring procedures and increasing the number and frequency of monitoring inspections. However, we have only inspected a few of the total number of heritage resource sites on the Forest. Although the total number of damaged sites that have been stabilized are few, we are making efforts to repair damage. Funding and personnel limit additional stabilization, and/or data recovery efforts. The monitoring questions are relevant and illicit information that is essential for monitoring Forest Plan objectives.

The Forest Plan standards and guidelines are being implemented and are effective in meeting resource objectives, i.e. site protection and preservation. There is a need, however, to continue heritage resource monitoring to ensure that the standards and guidelines are continually met. We have in the past three years made significant progress to develop standard monitoring procedures and increase the amount of monitoring inspections. However, we have inspected only a relatively few of the Forest's heritage resources. Although the total number of damaged sites that have been stabilized are few, we are continuing to repair observed damage.

The Tongass heritage program team has adopted the philosophy that site protection is best served through education and public outreach, fostering a fuller appreciation of the values embodied in the archaeological record and thus recruiting the public as active stewards of heritage resources. Delineating this philosophy, the forest's archeologists are increasingly working with public school students, contributing to the development of college curricula (through the University of Alaska SE and other institutions), sharing new discoveries at community functions and at public facilities. Through programs such as Alaska Archaeology Month and Passport in Time archeologists have connected with thousands of Alaskans who now have a better appreciation of the value of heritage resources and our approach to their management.

A closer relationship between Native Americans and archaeologists in the management of heritage resources and the conduct of archaeological research is being developed. New regulations implementing

the National Historic Preservation Act require much closer and sustained consultation at all levels of project planning. The ongoing process of repatriation and consultation under the Native American Graves Protection and Repatriation Act bring federal agencies and tribes into close contact. At the same time, in Southeast Alaska, Sealaska Corporation is attempting to begin an active management program for it 85 historic and cemetery sites acquired through the historic and cemetery sites provisions of the Alaska Native Claims Settlement Act (ANCSA 14(h)(1)). Sealaska seeks to work with clans and tribes to develop plans to manage these sites and to influence the management of historic and archaeological sites on other lands (federal, state, private).

A significant step forward in management of cultural resources in Southeast Alaska would be to develop agreements for cooperative management of historic and archaeological site in the region. Working together, clans, tribes, corporations, and federal and state agencies could more effectively learn from and protect these important cultural places.

Scenery

Evaluation:

The Forest Plan monitoring and evaluation criteria for determining the effectiveness of the Scenery standards and guidelines are used to determine whether the standards and guidelines associated with the harvest unit size, type of silvicultural system used, amount of dispersal between units, and the overall percent of viewshed disturbed are generally adequate to meet the different visual quality objectives in different types of landscapes.

The Forest Plan directs that a representative set of viewsheds across the Forest that have been harvested during implementation of TLMP standards and guidelines be selected for evaluation and monitoring. The Forest Plan specifies certain criteria for these viewsheds with regard to use areas or travel routes on the Visual Priority list. The Forest plan recommends representing the different characteristic landscapes and different Visual Absorption Capability settings. Monitoring is also recommended to assess the effectiveness of alternatives to clear cutting management.

Monitoring and evaluation reporting is scheduled to occur 3 – 5 years following adoption of TLMP and at approximately 5 year intervals thereafter. In FY 1999, extensive monitoring was undertaken on the Tongass to assess the adequacy of the scenery standards and guidelines in the Forest Plan. Four viewsheds were analyzed across the Tongass. The results were documented in the 1999 TLMP monitoring report. In FY 2000, no formal effectiveness monitoring of Forest development activities based on TLMP scenery monitoring protocols was completed.

Action Plan:

Since the adoption of the Forest Plan in 1997 very little harvest of planned timber sales has occurred which used the Plan's new scenery standards and guidelines. Some small timber sales have been recently implemented which were planned using the current Forest Plan's standards and guidelines. These harvested areas will be the focus of future monitoring activities to determine if the results of this harvest can adequately address the TLMP monitoring question. Funding for monitoring activities, however, appears to be limited at this time. Therefore, the amount of formal monitoring conducted in these possible areas will depend upon the level of funding allocated

Monitoring of the effectiveness of the Scenery standards and guidelines relative to the harvest unit size, type of silvicultural system used, amount of dispersal between units, and the overall percent of viewshed disturbed are anticipated to continue. A representative set of viewsheds across the Forest that have been harvested during implementation of TLMP standards and guidelines will be selected for evaluation and monitoring. Monitoring is anticipated to assess the effectiveness of alternatives to clear cutting management.

Subsistence

Evaluation:

The effects of management activities on subsistence users in rural Southeast Alaska communities have not been determined to be inconsistence with those estimates in the Forest Plan. Many of the projects are long term in nature and the results will not be available for several years.

The Alaska National Interest Lands Conservation Act (ANILCA, 1980) requires a priority for subsistence uses by rural residents on Federal public land in Alaska (Title VIII). Since 1990, the Federal Government has been managing resources for subsistence use on Federal public lands through the Federal Subsistence Board. In 1995, the Ninth Circuit Court of Appeals ruled that the existing scope of the subsistence program should be expanded to include"...*those navigable waters in which the United States has an interest by the virtue of the reserved water rights doctrine.*" Subsistence management of these waters became effective in October 1999.

To date, this new responsibility has resulted in the development of investigative projects designed to evaluate the condition of fish stocks important to subsistence fisheries, Traditional Ecological Knowledge (TEK), and consistency of the various existing fish harvest regulations. In addition to working through another annual cycle of wildlife regulation proposals, the first cycle of subsistence fishing regulation proposals were evaluated and presented to the Southeast Regional Advisory Council.

A total of 71 NEPA documents were signed in FY 2000. For each of these projects, the effects on subsistence resources were analyzed and a subsistence determination was made.

Consultations with tribes and communications with community leaders took place in many forms. These included informal meetings, informal public open houses, two formal 810 hearings, national roadless area meetings, Fish and Game Advisory Board meetings, other organized group board meetings, and teleconferences. There were at least 72 meetings between Forest Service representatives and members of the public that resulted in discussions concerning subsistence issues. There were several cultural camps throughout the Tongass National Forest this fiscal year. The Forest Service was not a major participant in any of these camps this season.

TRUCS updates will be available over the next few years. New TRUCS maps and analysis will be completed when the new data is collected. Annual report from the subsistence Regional Advisory Council (RAC) and Federal Subsistence Board response to the RAC report are available from the Forest Subsistence Coordinator. Data on wildlife harvest, commercial and sport fish harvest, and subsistence are available from ADF&G. The census data for 2000 is not yet available.

A series of new projects were initiated in fiscal year 2000 on the Tongass. These projects are being conducted in cooperation with the State Department of Fish and Game, local individuals, community governments, and tribal governments. Several other data collection efforts are on going and are in a variety of stages of analysis. Information concerning these data sets can be obtained from the appropriate Forest Service office. These data sets include: Tongass deer jawbone/teeth age data, Tongass leg bone/fat analysis data, Tongass deer pellet count mortality data, Petersburg Ranger District marten study, Petersburg Ranger District deer study, Petersburg Ranger District wolf study, and Thorne Bay Ranger District Heceta Island deer study.

Action Plan:

Recommendations follow to continue to evaluate the effects on subsistence users in rural Southeast Alaska communities and compare those effects with the estimates in the Forest Plan.

Continued implementation of the subsistence monitoring report template that was developed in FY 1999 is recommended. This template organizes and displays monitoring information to facilitate description of the effects of management activities on subsistence users.

Continuation of the work in support of Federal responsibilities in managing subsistence on public lands and in navigable waters is anticipated. The effects on subsistence resources will be continue to be analyzed in NEPA documents and subsistence determinations will be made on these activities.

Consultations with tribes and community leaders are anticipated to continue. Work associated with updates on TRUCS will continue with anticipation that the new maps and analysis will be complete when data is available. Information will continue to be evaluated from the annual report from the subsistence Regional Advisory Council (RAC), reports from the Federal Subsistence Board response, Alaska Department of Fish and Game and Other State Agency Data Summaries, and ADF&G Division of subsistence data. The census data will be incorporated into the analysis.

A series of new projects were initiated in FY 2000 on the Tongass and these projects are anticipated to continue. These projects are being conducted in cooperation with the State Department of Fish and Game, local individuals, community governments, and tribal governments.

Timber

Timber Implementation

Evaluation:

Timber monitoring for implementation focuses on the limitation of created openings greater than 100 acres and the 1000 feet beach and estuary buffer requirement. Implementation of the Best Management Practices related to timber is discussed in the soil and water, fish habitat, karst and caves, as well as wetlands sections.

Monitoring showed that 5,923 acres fully or partially harvested (4,593 acres which resulted in the creation of a opening) in fiscal year 2000. Four created openings exceeded 100 acres in size. One unit was on the Petersburg District (420-45), two units were on the Craig District (613-107 and 613-254), and one on Ketchikan-Misty District (BC6031). All of these were analyzed and approved in the Records of Decision. There were 18 stands harvested during 2000 that fell partially or completely within the 1,000-foot beach and estuary zone. All of these harvests were from Category 1 sales that did not need to be modified as a result of the 1997 TLMP Revision and its 1,000-foot beach and estuary standard and guideline. The stands that fell within the buffer were located on five ranger districts. The timber harvesting activities were shown to be adhering to the standard and guidelines.

Action Plan:

The timber harvesting activities were shown to be adhering to the standard and guidelines consistently over the past and present. Timber monitoring for timber implementation is recommended to continue focus on the limitation of created openings greater than 100 acres and the 1000 feet beach and estuary buffer requirement. Continued application of the Forest GIS system to identify and describe the harvest units relative to size, location and beach buffers is recommended.

Timber Restocking

Evaluation:

Monitoring has shown that achieving regeneration that meets the stocking guidelines and certification standards identified in the Silvicultural Practices Handbook (FSH 2409.17) is rarely a problem on stands receiving a regeneration harvest on the Tongass National Forest. Certain specific site conditions and opportunities indicate a need for artificial regeneration.

All harvested lands are examined following treatment. Artificially seeded or planted areas are examined one and three years after treatment. Examination occurs three growing-seasons after treatment in areas where it is anticipated that natural regeneration will be adequate. Stands are certified as stocked, if the third growing-season survey indicates that the areas meet stocking standards. Artificial regeneration is prescribed if the third-year survey indicates that natural regeneration is highly unlikely. During fiscal year 2000, 3,298 acres were examined to determine the condition of the regeneration in harvest areas. Based on the Silviculture information system (SIS), timber harvest that occurred in fiscal years 1991 through 1995, are scheduled for evaluation. The status of reforestation reports show that 100 percent of the acres following timber harvest in 1991- 1995 are adequately stocked within five years following timber harvest.

Action Plan:

The Silviculture staff on the Tongass monitors the status of all regeneration harvests as required by the 1976 National Forest Management Act (NFMA). NFMA requires lands will be harvested only where they can be adequately restocked within five years. While we do not expect future regeneration problems (southeast Alaska has excellent climatic conditions for re-establishing tree cover after disturbance) it is worthwhile to continue our field surveys and data base tracking. The preparation of this annual monitoring report serves as a good way for the public to be assured we are meeting the NFMA and Forest Wide standard and guideline requirement.

Timber Allowable Sale Quantity

Evaluation:

Monitoring showed the Allowable Sale Quantity (ASQ) is consistent with resource information and programmed harvest. The ASQ is an upper ceiling governing the amount of timber that may be sold over a decade. The amount of sold timber may vary year to year but must not exceed the decadal ceiling. Timber is considered sold when the contract is awarded to the high bidder.

Examining the amount of timber sold during fiscal years 1997 through 2000, and comparing the total to the average annual amount of the ASQ, the timber volume was consistently lower than the ASQ. The timber volume sold ranged from 9 percent to 91 percent of the ASQ over the years from 1997- 2000. The measure of the allowable sale quantity is the timber volume sold, not the amount advertised or harvested per year. Timber sales sold during one year are typically harvested over several years. Comparing the harvest totals for the Tongass National Forest for fiscal years 1990 through 2000 to the ASQ illustrates the difference between timber sold and harvest totals. The timber tables display that current timber harvest and timber sold levels are not at or near the 1997 and/or the 1999 Forest Plan ASQ ceilings. The effects of timber harvest are below the amount analyzed in the 1997 TLMP FEIS and /or the 1997 and 1999 TLMP FEIS Record of Decisions. Therefore, with implementation of land use designation prescriptions, Forest Plan standards and guidelines, and Best Management Practices, the allowable sale quantity is consistent with resource information and programmed timber harvest.

Action Plan:

Congress sets the programmed harvest with the development of the budget formulation process each fiscal year. Each District office submits a "bottom up" request for funding to cover the anticipated harvest offer preparation plan that they develop. If the programmed harvest budget is more or less than that developed on the District, the amount of funding can be requested or returned to coincide with the estimated output. As displayed in the table "Tongass National Forest Timber Sold By Fiscal Year", the amount of timber sold is below the ASQ set in the Forest Plan. Field inventory resource information is developed as timber sale proposals are developed through the planning process. Therefore, there are adequate accuracy checks to maintain a long-term sustained yield timber program within standards and guidelines to protect resources.

The ASQ is consistent with resources and programmed harvest as long as the suitable timber land base is maintained. Major decreases in the suitable timber land base can create inconsistencies in the balance between the ASQ and programmed timber harvest.

No action is necessary at this time in changing the monitoring process. We plan to continue to monitor the level of programmed harvest.

Timber Non-Interchangeable Components

Evaluation:

Monitoring shows the Non-Interchangeable Components (NIC) of the allowable sale quantity (ASQ) are consistent with actual harvest. Accuracy of the proportional mix of timber volume in the NIC I and NIC II categories can not be distinguished until additional data is collected and analyzed. The purpose of partitioning the ASQ into two separate components is to maintain the economic sustainability of the timber resource by preventing over-harvest of the most economic timber stands. The partitioning of the

ASQ also serves to identify that portion of the timber supply that is at risk of attainment because of marginal economic conditions. The NIC I component includes land that can be harvested using normal economic logging systems. Normal being defined as standard logging systems such as shovel and short span cable. The NIC II component includes land with high logging costs that are typically economically and technologically marginal. The NIC II component includes difficult and isolated operable timber stands requiring special logging equipment requirements due to yarding distances or topography (such as the use of long-span cable, multi-span cable and helicopter).

Comparison of NIC I and NIC II Harvest By Fiscal Year, Based on Percent of Total Harvest shows that the percentage of NIC I and NIC II is relatively close to the proportional mix percent approximated in the Forest Plan and Modified Forest Plan. The proportional mix in the Modified Forest Plan is set at approximately 80 percent NIC I and 20 percent NIC II reflecting a higher proportion of NIC II than in the 1979 Forest Plan. The proportional mix of NIC I: NIC II was 77 percent: 23 percent in 2000.

The Modified Forest Plan ROD states the ratio of the NIC I and NIC II mix is approximately 80 percent NIC I and 20 percent NIC II (Final EIS, Table 3-81, page 3-282 and 1999 ROD page 13). The mix of NIC I and NIC II for fiscal year 2000 as displayed above is 77 percent NIC I and 23 percent NIC II. Although the NIC data has only been monitored for two years (and estimated one year) there appears to be an upward trend in the proportion of the NIC II lands harvest component. The trend toward an increasing NIC II proportion may continue as the Forest implements more timber NEPA decisions post 1999 TLMP ROD.

It is to early to distinguish if the proportional mix of non-interchangeable components is estimated accurately. Not enough data has been collected and analyzed to date to make this determination. There seems to be an upward trend in the proportion of NIC II lands harvested. This trend may be partly due to resource protection needs and respectively addressing this mitigation through helicopter logging which contributes to increase NIC II harvest proportion. In these situations helicopter is utilized although other cable systems may be capable of achieving the same objectives. The timber commodity market has been improving since the low Pacific Rim market experienced in 1998. The execution of timber sale contracts during the low market period were held and timber not harvested in speculation of market improvement. In fiscal year 2000, purchasers may have harvested timber sale contracts that approached contract termination dates (those unexecuted in the '98 low market). The Ketchikan Pulp Company Long Term Sale Contract ended and accounted for approximately 60 to 65 percent of the helicopter harvest on the Forest in fiscal year 2000.

If the proportional mix in NIC I and NIC II is not accurately estimated in the Forest Plan it will contribute to higher harvest operating costs. Forest Service interdisciplinary teams planning timber sales need to weigh the costs and revenues of adding NIC II lands to increase timber volume prior to the NIC I proportion of the ASQ being satisfied. No action is recommended at this time. Continued monitoring the proportional mix of harvest from NIC II category lands is necessary to provide the data necessary to determine if the proportional mix of volume in NIC I and NIC II as estimated I the Forest Plan is accurate.

Action Plan:

The ASQ consists of two separate Non-Interchangeable Components (NIC). Under the 1999 Modified Forest Plan the ASQ is divided into NIC I set at 1.53 billion board feet of timber per decade and NIC II set at .34 billion board feet per decade. The economic components of the ASQ equate to an average of 153 million board feet NIC I and 34 million board feet NIC II per year. The Forest Plan sets the proportional mix of timber harvest volume for the NIC I and NIC II categories. The proportional mix in the Modified Forest Plan is set at approximately 80 percent NIC I and 20 percent NIC II (1999 TLMP FEIS ROD, pgs 12, 13). This represents a higher reliance on the NIC II component than that found in the 1979 Forest Plan. The trend toward an increasing NIC II proportion may continue as the Forest implements more timber NEPA decisions post 1999 TLMP ROD.

All timber sale harvest units that were completed during fiscal year 2000 were categorized into non-interchangeable components using the Forest plan operability layer in the geographic information system (GIS). Utilization of this GIS system is recommended to continue, and further revision of the process used to track NIC I and II is ongoing.

As long as the amount of timber offered is below the NIC I amount of the ASQ (153 MMBF/year average) it does not really matter what portion of NIC II is offered, since in theory it would only be offered after the NIC I proportion is satisfied. As depicted in the tables, a substantial amount of NIC II lands are included in timber offerings prior to the NIC I proportion being satisfied. This will help insure that the more economic land base is not over harvested. Conversely, the NIC II inclusion with timber offerings prior to the NIC I component being satisfied decreases the economics of the timber offerings as a whole.

No action is necessary at this time in the monitoring process or proportional mix of NIC I and II. Recommendations follow to continue to monitor the trend of harvest from NIC II lands.

It is to early to distinguish if the proportional mix of non-interchangeable components is estimated accurately. Not enough data has been collected and analyzed to date to make this determination. If the proportional mix in NIC I and NIC II is not accurately estimated in the Forest Plan it will contribute to higher harvest operating costs. Higher harvest operating costs could limit the ability of purchasers to compete for a timber supply from the National Forest. Higher costs could ultimately drive timber purchasers and manufacturing facilities out of business, if the timber commodity prices do not increase proportionately. It may be likely to see higher operating costs generated on National Forest timber sales with the implementation of the 1999 Modified Forest Plan. Forest Service interdisciplinary teams planning timber sales need to weigh the costs and revenues of adding NIC II lands to increase timber volume prior to the NIC I proportion of the ASQ being satisfied. No action is recommended at this time. Continued monitoring is necessary to evaluate the proportional mix of harvest from NIC I and NIC II category lands.

<u>Timber Maximum Harvest Unit Size</u>

Evaluation:

Monitoring indicates there is no need to pursue change in the maximum opening size or the factors for approving openings greater than 100 acres. The 1976 National Forest Management Act (NFMA) regulations established 100 acres as the maximum size for created openings using the even-aged system (clearcutting, seed tree, and shelterwood) within the western-hemlock, Sitka spruce forest type of coastal Alaska. The Forest Supervisor and the Regional Forester can approve openings up to 150 and 200 acres, respectively, in situations defined in the Forest Plan's Forest-wide standards and guidelines.

During this fiscal year, 181 timber stands were delineated in the Forest's geographic information system (GIS), and Silviculture Information System (SIS) database. Taking adjacency into account (harvested stands that touch one another, which create a larger opening when added together), 130 harvest areas were logged in fiscal year 2000 that created openings using the even-aged silvicultural system. Four of the openings created exceeded 100 acres in size. The 130 openings averaged 35 acres, and ranged from 1 to 121 acres in size.

Trends in harvest opening size have been toward smaller openings and less reliance on the even-aged silvicultural system. Forest Plan standards and guidelines for scenery, sensitive species such as Northern goshawk and American marten, and soil and water Best Management Practices (BMPs) emphasize smaller sizes. Also, emphasis on leaving old-growth structure in harvest areas is resulting in breaking up the once large harvest size. In addition to the 130 units discussed above, 33 units were harvested using either uneven-aged or two-aged systems or were salvage harvested. Totaling 1330 acres, these harvest units ranged in size from 1 acre to 214 acres.

Action Plan:

The Forest demonstrated effective management for compliance with criteria for the maximum opening size and criteria for approving openings larger than 100 acres. Continuation of the present implementation and monitoring is recommended. Opening size for a number of years has continued to decline. This is a result of increased consideration for riparian, visual, wild life, fish and other resources. When size limits are occasionally exceeded it is done only after analysis and line officer approval in an EIS or EA and subsequently issued decision document. Continued application of the USFS GIS and SIS databases for tracking and analysis of openings is recommended. The preparation of this report question serves as a good way for the Public to be assured we are meeting opening size requirement.

Objective 2.d

Objective 2.d—Increase accessibility to a diversity of people and members of underserved and low-income populations to the full range of uses, values, products, and services.

In reference to Objective 2.d, the monitoring completed on land management planning, local and regional economies, recreation and tourism, and subsistence describe the status of the Forest relative to multiple benefits to people. Significant issues addressed in the monitoring this year included:

- Consistency of land management planning with management objectives of adjacent lands
- Effects on employment and income
- Management of Forest relative to the prescribed Recreation Opportunity Spectrum classes (discussed in Objective 2.a.)
- Consistency in effects of Forest Management relative to subsistence users with anticipated effects (discussed in Objective 2.c.)
- Implementation of Wild, Scenic, and Recreational River standards and guidelines (discussed in Objective 2.a.)
- Effectiveness of Wild, Scenic, and Recreational River standards and guidelines (discussed in Objective 2.a.)
- Implementation of Wilderness standards and guidelines (discussed in Objective 2.b.)
- Effectiveness of Wilderness standards and guidelines (discussed in Objective 2.b.)

Land Management Planning

Evaluation:

Management of National Forest System lands is consistent with management objectives of adjacent lands and their management plans in fiscal year 2000. Efforts of the Forest Service to improve government-to-government relationships as well as collaborative, community-based resource stewardship contributed to achieve compatibility of Forest Service management activities with the goals and objectives of adjacent lands. The trend of consistency has been documented over the past 3 years.

National Forest Management projects with decisions completed in fiscal year 2000 were evaluated to determine if any non-National Forest lands existed adjacent to the project location. Projects that have been appealed, and decisions remanded during the 2000 fiscal year were not evaluated. The projects identified as having adjacent non-National Forest system lands (adjacent is defines as within a distance that could possibly be influenced by Forest management) include the following projects listed by ranger district:

- Juneau Ranger District: Glacier Gardens Motorized Trail
- Ketchikan/Misty Ranger District: Ketchikan Lakes Hydroelectric Project, Salty Timber Sale
- Petersburg Ranger District: Pre-Commercial Thinning and Pruning
- Thorne Bay Ranger District: Luck Lake Record of Decision
- Wrangell Ranger District: Mill Creek Trail Reconstruction, Expansion of Virginia Lake Enrichment and Monitoring Activities, Donut Timber Sale

Action Plan:

Continuation of the Forest efforts to improve government-to-government relationships as well as collaborative, community-based resource stewardship is essential to achieve compatibility of Forest Service management activities with the goals and objectives of adjacent lands. Monitoring of the effects of the National Forest management on lands, resources, and communities adjacent to or near the Forest projects will continue. Effects upon Forest lands from adjacent land activities managed by other government agencies and under the jurisdiction of local governments will also be monitored.

Local and Regional Economics

Employment and Income

Evaluation:

Monitoring of the effects on employment and income from Forest management relative to Forest Plan estimates is inconclusive at this time. Additional data collection and evaluation is necessary to quantify and qualify the effect. The Tongass comprises about 90 percent of Southeast Alaska's land base and the 33 communities within Southeast Alaska are dependent upon the Forest resources for economic opportunities, quality of life, traditions and cultures, and recreational activities.

Annual monitoring data utilized for this evaluation are from the Alaska Department of Labor and these results are compared against the estimates in the Forest Plan. The employment data in the Forest Plan was estimated for the Allowable Sale Quantity (ASQ) harvest and the Non-Interchangeable Component I (NIC I) harvest. The Southeast Alaska Employment and earnings, Annual Equivalent (Non-agriculture Wage and Salary (NAWS) Employment and Earnings reports on slightly different categories than those listed in the Forest Plan. These differences are in the recreation/tourism and salmon harvesting categories. Generally, the jobs associated with the wood products reported in NAWS are generally consistent with the Forest Plan estimates. The total number of jobs in Southeast Alaska reported in NAWS is lower than the estimate in the Forest Plan. There are some disparities between the jobs reported for the Retail and Services reported in the NAWS and the estimates in the Forest Plan for Recreation and Tourism as well as in Mining. The Forest Plan estimates for jobs in these categories were significantly higher than the NAWS report. The earnings data for 2000 is not available. The earnings levels in the past reported in NAWS have been higher for the wood products and recreation tourism than the Forest Plan estimates. The earnings levels for mining in the past reported in NAWS have been lower than the estimates in the Forest Plan. Most of these differences can be partially attributed to the difference in the category definitions (i.e. employment groups and self employed persons), the assumption in the Forest Plan estimates of full implementation, and modeling used in the Forest Plan.

Action Plan:

Continued monitoring and evaluation of the effects on employment and income from Forest Management is underway. Clarification and segregation of the category definitions is necessary to compare the Southeast Alaska Employment and earnings, Annual Equivalent (Non-agriculture Wage and Salary (NAWS) Employment and Earnings reports and the employment and income estimates in the Forest Plan. Compensation for less than full implementation in the employment categories needs to be made to the Forest Plan estimates. Re-evaluation and updating of the assumptions and criteria for the Forest Plan model utilized to determine projected employment and income levels is recommended.

Objective 2.e

Objective 2.e—Improve delivery of services to urban communities.

In reference to Objective 2.e, the monitoring completed on heritage resources, land management planning, local and regional economies, recreation and tourism, scenery, subsistence, timber, wild and scenic rivers, wilderness, and cost and outputs describe the status of the Forest relative to multiple benefits to people. Significant issues addressed in the monitoring this year included:

Consistency of land management planning with management objectives of adjacent lands (discussed in Objective 2.d.)

Effects on employment and income (discussed in Objective 2.d.)

Management of Forest relative to the prescribed Recreation Opportunity Spectrum classes (discussed in Objective 2.a.)

Outputs produced by the Forest

Costs and Outputs

Evaluation:

Reviewing the results of the monitoring of the outputs and associated costs for these outputs, there were significant accomplishments of targets for the funds spent in fiscal year 2000. From the data collected and monitoring evaluation completed, it is not possible to distinctly discern if the costs associated with carrying out the planned management prescriptions are consistent with the costs estimated in the Forest Plan. Many of the activities planned for completion in fiscal year 2000 were not fully completed due to personnel and fiscal constraints. Personnel detailed to assist with fire suppression in the lower 48 and late distribution of the budget contributed to delay project completion in several resource areas.

Target accomplishments were reported in the management areas listed: land management planning; ecosystem management; recreation, wilderness, and heritage management; wildlife management; fisheries management; threatened and endangered species management; range management; timber and forest vegetation management; soil and water management; minerals management; land management; and road, trail, dam, and bridge management.

The allocation and expenditure amounts were obtained from the preliminary September 2000 fund control report and information submitted to the Regional Office for missed end of year obligations. At the time of this monitoring evaluation, the final fiscal year 2000 reports were not available and some of the fiscal obligations had not been processed so the expenditures can only be considered estimates. Comparison between the prior years and this fiscal year allocations and expenditures was not possible due to changes associated with unification and implementation of a new budgeting system in fiscal year 2000. Comparison of the allocations and expenditures for this fiscal year shows that overall the Forest spent only approximately 81 percent of the funds allocated by EBLI and 72 percent of the KV funds allocated according to preliminary figures prior to processing of some of the fiscal obligations. Projections indicate that the Forest will probably have spent less than the allocation in fiscal year 2000 but the expenditure will probably be relative to the work and associated target completion.

Action Plan:

Continued monitoring of the costs and outputs is recommended. Additional data needs to be collected to discern if the costs associated with carrying out the planned management prescriptions are consistent with the Forest Plan estimates. The closer correlation between the budget allocations and targets in fiscal year 2001 should provide information for the evaluation. The earlier distribution of allocation information should contribute to help the resource groups plan resource management activities and effectively utilize the allocations to complete work and associated targets.

Goal 3: Scientific and Technical Assistance

Develop and use the best scientific information available to deliver technical and community assistance and to support ecological, economic, and social sustainability.

Objective 3.a—Better assist in building the capacity of Tribal governments, rural communities, and private landowners to adapt to economic, environmental, and social change related to natural resources.

Objective 3.b—Increase the effectiveness of scientific, developmental, and technical information delivered to domestic and international interests.

Objective 3.c—Improve the knowledge base provided through research, inventory, and monitoring to enhance scientific understanding of ecosystems, including human uses, and to support decision making and sustainable management of the Nation's forests and grasslands.

Objective 3.d—Broaden the participation of less traditional research groups in research and technical assistance programs.

Objective 3.a

Objective 3.a—Better assist in building the capacity of Tribal governments, rural communities, and private landowners to adapt to economic, environmental, and social change related to natural resources.

In reference to Objective 3.a, the monitoring completed on local and regional economies describes the Forest's efforts to using the best scientific information available to deliver technical and community assistance. Significant issues addresses in the monitoring this year included:

> Work completed by the Forest Service with local communities to identify and pursue Rural Community Assistance Opportunities

Local and Regional Economics

Rural Community Assistance Program

Evaluation:

Monitoring completed in fiscal year 2000, shows the Forest service has worked with the local communities to identify and pursue Rural Community Assistance Opportunities. The Rural Community Assistance (RCA) Program is a Forest Service program that directly includes the Economic Recovery Program (ERP) and the Rural Development (RD) program. The RCA program indirectly includes participation in the Southeast Alaska Community Economic Revitalization Team (SEA-CERT). The Economic Recovery Program has grants that are available to (a) organize a community action team, (b) develop a community action plan, and (c) implement projects from the community action plan. Grants are competitive, and contingent on annual appropriations. The Rural development Program provides seed money for community projects statewide that will produce long-term jobs in the communities. SEA-CERT is a federal-state partnership organized to help communities maintain, strengthen or diversify their economies by providing improved access to technical, permitting and financial assistance.

The Forest has participated in the ERP program by notifying rural communities of the program and responded to requests for assistance from communities through a competitive grants program. The Forest Service participates in the Rural Development Program through a cooperative agreement with the State of Alaska to provide this funding through the State's Community Development Block Grant (CDBG) mini-grant program. The program provides seed money for community projects statewide that will produce long-term jobs in the communities. The Tongass Forest Supervisor shares the Federal Co-chair seat of SEA-CERT with the State Director of USDA Rural Development. The Tongass NF RCA coordinators provide staff support to the SEA-CERT.

Positive contributions were noted in the community level effects of the RCA program in the 30 of the 35 Communities and the Southeast Conference. Specific contributions were reported in the Economic Recovery Program and Rural Development Program. Although the SEA-CERT program was largely inactive this year, we continue to see the positive effects of improved communication, coordination, and

collaboration between State and Federal agencies on behalf of participating communities. The forest staff readily works with communities who desire assistance. Some districts have increased collaborative stewardship efforts that often lead to identification and pursuit of RCA opportunities. Monitoring levels are fully adequate.

Action Plan:

Monitoring of the Rural Community Assistance Program is planned to continue in fiscal year 2001. The Forest Service is continuing to work with the local communities to identify and pursue Rural Community Assistance Opportunities. The Rural Community Assistance (RCA) Program is continuing to include the Economic Recovery Program (ERP) and the Rural Development (RD) program. The RCA program will continue to indirectly include participation in the Southeast Alaska Community Economic Revitalization Team (SEA-CERT).

The Forest will continue to participate in the ERP program by notifying rural communities of the program and respond to requests for assistance from communities through a competitive grants program. The Forest Service plans to continue to participate in the Rural Development Program to provide this funding through the State's Community Development Block Grant (CDBG) mini-grant program. The Tongass Forest plans to continue to participate in SEA-CERT in cooperation with the State.

Objectives 3.b, 3.c and 3.d

Objective 3.b—Increase the effectiveness of scientific, developmental, and technical information delivered to domestic and international interests.

Objective 3.c—Improve the knowledge base provided through research, inventory, and monitoring to enhance scientific understanding of ecosystems, including human uses, and to support decision making and sustainable management of the Nation's forests and grasslands.

Objective 3.d—Broaden the participation of less traditional research groups in research and technical assistance programs.

In reference to Objective 3.b, 3.c, and 3.d, the monitoring completed on research describes the status of the Forest Relative to using the best scientific information available to deliver scientific and technical assistance. Significant issues addresses in the monitoring this year included:

Research completed to fulfill high priority information needs.

Research

Evaluation:

Monitoring of the Research completed in cooperation with the Pacific Northwest (PNW) station shows that the high priority information needs of the Forest are being addressed in various research projects. Priority research was identified in the Forest Plan for implementation of the plan in addition to further amendment and revision of the plan. The research results will contribute to substantially strengthen the scientific information base needed to support alternative plan development. The research also contributes to the adaptive management feedback loop to evaluate the current plan direction, design monitoring programs, and adjust future management to better address economic, social and environmental concerns. Through application of statistically sound sampling design and analysis techniques the reliability of monitoring data and interpretations will be assured and the scientific credibility of the Forest Plan will be maintained.

Specific progress was made as summarized on the following list of projects. Some preliminary results of this work have been utilized in implementation of the Forest Plan. None of these preliminary results have identified a need to revise the Forest Plan.

1) Project 1. Alternatives to Clearcutting (ATC)

Vegetation data was collected with a system of permanent sample plots. These measures include species, age, size, form, growth, microsite, and presence of damaging agents. Understory vascular plant cover and biomass were measured on these plots to characterize plant abundance, diversity, and deer forage availability. To characterize the pre- and post-harvest composition and density of forest birds, censuses were conducted during the nesting season.

We examined invertebrate (terrestrial and aquatic) and coarse detritus transport from forested headwaters to downstream aquatic habitats. Fifty-two small streams representing a geographic range throughout Southeast Alaska were sampled with 250-μm nets per 24-h intervals either seasonally (spring-summer-fall) or biweekly throughout the year. Sampling occurred in fishless reaches, and in most cases upstream of salmonid-bearing habitats, to assess the potential energy subsidies fishless headwater streams make to downstream salmonid habitats.

An automated system of sensors and dataloggers was established to continuously record rainfall and groundwater accumulation and movement. These data will be used to determine the groundwater response to seasonal and individual-storm rainfall, both before and after treatment. Multiple years of pretreatment data were collected, allowing us to characterize baseline levels of year-to-year and seasonal variability.

1a) <u>Project 1a.</u> Alternatives to Clearcutting (ATC) --Social Acceptability of Alternative Forest Management Practices

This larger interdisciplinary study aims to evaluate the ecological, economic, operational, and social aspects of an array of timber harvesting techniques as alternatives to clearcutting old-growth forest stands in Southeast Alaska. This long-term project comprises the social acceptability component of the larger study.

A literature review was completed in FY 1999 and early FY 2000. Field researchers used photographs and preliminary findings from the larger Alternatives to Clearcutting project to frame structured interviews with Southeast Alaska residents. A final report was completed. Results were presented at the Society and Natural Resources Symposium in Bellingham in June 2000.

The resident survey component of this project was pre-tested and ready to be administered in February 2000. This component is on hold pending OMB approval for a resident survey in Southeast Alaska.

2) <u>Project 2.</u> Effects of Silvicultural Treatments on Young-Growth Wood Quality

Stands were sampled that were experimentally treated 22 to 24 years ago as part of a long-term density study of even-aged stands in southeast Alaska. An experimental design was unusually rich compared with typical wood quality studies: it included two species (western hemlock and Sitka spruce), four thinning levels (unthinned, light, medium, and heavy), four stand ages at time of thinning (spanning 15 to 45 years), and two levels of site quality (moderate and high).

The testing of the NDE system and laboratory evaluation of wood mechanical properties has been completed and a report has been published (Wang, Xiping; Ross, Robert J.; McClellan, Michael H.; Barbour, R. James; Erickson, John R.; Forsman, John W.; McGinnis, Gary D. 2000. Strength and stiffness assessment of standing trees using a nondestructive stress wave technique. Res. Pap. FPL-RP-585. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory. 9 p.). This paper focuses on the performance of the *in situ* NDE system in comparison with traditional destructive laboratory testing. A second paper will be prepared that examines the relationships between silvicultural treatments and wood mechanical properties in more detail.

X-ray densitometry studies are continuing. In June 1999, we contracted with Robert Megraw at the Weyerhaeuser Technology Center to conduct the x-ray densitometry. This work commenced in August 1999 and the scanning of the 1050 samples was completed in August 2000. Analysis of these data is underway, and will provide information on thinning effects on wood density, growth-ring distribution, proportion of juvenile wood, and distribution of earlywood and latewood.

Development of the branch model is continuing. The data for the model were collected in 1998 from trees that were felled for destructive sampling and from standing trees within the measurement plots of the stand-density study. The model will predict branch frequency, size, and distribution as a function of species, thinning intensity and timing, and site quality. As an interim product, we plan a manuscript describing branch distribution and wood quality effects in butt logs of spruce and hemlock.

A companion study of responses to pruning is progressing well. We expect a draft manuscript on epicormic branching in spruce (Western Journal of Applied Forestry), and we also expect completion of a manuscript on pruning effects on tree growth and survival, conifer ingrowth, and understory plant diversity and abundance (Canadian Journal of Forest Research).

For the study of thinning effects, we sought to better characterize the within-stand variation in wood properties, so in 2000 we collected wood cores at breast height from 160 western hemlock and Sitka spruce trees. The cores were collected from heavily thinned and control (unthinned) plots that were treated at 14 and 41 years of age. This sample brackets the treatment intensity and age at time of treatment in the main study.

3) Project 3. Evaluation and Development of Growth-and-Yield Models for the Adaptive Management of Young-Growth Stands in Southeast Alaska

Four major improvements were made to Superstand:

1. Corrected the routine for deducting defect volumes.
2. Revised the volume calculation routines to ensure the application of appropriate volume equations.
3. Revised the procedures for applying height-diameter relationships.
4. Revised the output format to be compatible with SEAPROG input requirements, thus eliminating the need for tedious editing by users.

From our recently completed study of the productivity of forested wetlands, we learned that FVS-SEAPROG growth predictions agree closely with observed growth in stands up to 45 to 50 years after clearcutting. On these poorly productive sites (representing the lower end of sites actively managed for wood production), the model showed no tendency to over- or underestimate growth.

Our analysis of performance on moderately to highly productive sites is continuing. Preliminary results from the analysis of residuals (estimates from plot measurements - FVS predictions) for basal area shows an approximately gaussian ("normal") distribution of residuals, but hypothesis tests of whether the mean of residuals is zero are soundly rejected ($P<0.001$). The mean value from observed residuals indicates SEAPROG is predicting too low in these cases. Residuals from prediction of cubic foot volume, 32-foot board-foot volume, and quadratic mean diameter all show central location to be at a positive value, which significantly differs from zero. Again, this indicates SEAPROG is predicting values that are lower than those determined from actual measurement of the plots. The Taylor plots (older, even-aged) included in the database seem to express the same pattern as the Farr plots. These results are preliminary and we are in the process of checking several model parameters to ensure that these results are correct.

4) Project 4. Goshawk Nest Tracking and Prey Abundance

The study is providing more detailed information on goshawk movement patterns, home range size, habitat use, and survival. Several surveillance cameras have recorded thousands of hours of video footage, helping to identify use patterns and prey brought to nests by adults to feed to young. During the field season, goshawks were banded on various nest sites and many radio-collared goshawks were monitored during the year. Results from the monitoring continue to indicate that the birds predominately use mature and old-growth forests for nesting and foraging.

5) Project 5. Density and Demography of Endemic Small Mammals

The third year of fieldwork is being completed as proposed in the study plan. To date, we completed virtually all the field work as outlined in the study plan on schedule with the exception of obtaining solid population estimates in both habitats in both seasons in the first year.

5a) Project 5a. Endemism and Distribution of Terrestrial Mammals on the Tongass National Forest

This effort is still discovering new species records for major islands; for example, water shrews on Wrangell Island, flying squirrels on Dall Island, and ermine on Heceta Island.

6) Project 6. Salmon Habitat Monitoring

The emphasis of the past three years of work has been on data collection and obtaining a range of samples that includes the major geographic areas of southeast Alaska from north to south. Single channel floodplain reaches were selected as the focus of the study to increase the probability of detecting differences (larger effect size) and to increase the statistical power of the sample size. Our focus on low-gradient, depositional channels, which respond to and retain the signature of many natural and land management-related disturbances throughout the watershed, is a cumulative effects approach. Preliminary data analysis has been completed in some aspects of the study to determine the adequacy of the sample plan, test methodologies, and to further develop hypotheses. This has allowed adjustments to some of the original objectives and to verification of sample methodologies. In 2001, data will be analyzed and draft results will be available.

7) Project 7. Community Level Economic Impacts and Dynamics

By providing empirical estimates of impact processes and a more detailed understanding of the determinants of local economic structure, this study area seeks to identify the dynamics of growth and impact in the region and its communities. This information, in turn, may be used to improve impact assessment and management decisions.

Robertson completed a Ph.D. thesis that provides an empirical estimation of the community level impacts of changing timber employment in Southeast Alaska. Robertson also completed a draft (currently in review) study quantifying the major determinants of economic growth and structural change in Southeast Alaska. This latter study concentrated on the increasing role of non-manufacturing and non-wage income in the regional economy.

8) Project 8. Recreation and Tourism

Recreation and tourism present a number of challenges to management of the Tongass National Forest. In contrast to timber, recreation/tourism outputs are difficult to measure, they usually have no explicit dollar value, and their "production functions" are not easily defined. Similarly, the influence of management decisions on the quantity and quality of outputs, as well as the impacts of recreation/tourism development in general on local welfare are still not well understood. With the increasing importance of recreation/tourism in Southeast Alaska, the need to better understand this resource and its relation to management has become increasingly obvious. This study program is designed to meet this need.

Two studies are now in progress: 1) Macroeconomic analysis of structure and trends in recreation and tourism in Southeast Alaska. Two reports are currently in draft form and should reach publication early in calendar year 2001. 2) Using markets and economic instruments as management tools for recreation and tourism in Southeast Alaska. Preliminary work was started in FY 2000; concentrated work in this area is scheduled to begin in Calendar 2001. Other progress involves gathering information on Forest Service recreation programs from TNF staff and developing familiarity with issues and tools related to user fees and other recreation pricing techniques.

9) Project 9. Timber Supply and Markets

This project focuses upon the economics of timber production and wood products processing in Southeast Alaska. Main topics include: (1) production costs and the Region's relative advantage in different types of wood products production; (2) the relative position of Southeast Alaskan species and log grades in foreign markets; and (3) demand projections for the Region's wood products. In FY 2000, most of the work was devoted to wrapping up this project.

10) Project 10. Tourism/Recreation Studies

This long-term project initiates study of tourism and recreation topics in the Tongass National Forest. Research is planned to examine aspects of the increasing tourism and recreational use of the forest, residents attitudes and values concerning tourism development, tourism and recreation demands on forest resources, tourism and recreation growth vectors, and the interaction of tourism and recreation with other forest uses. Initial research will focus on Southeast Alaska residents and communities. Subsequent years' research will examine visitors' experience with the Tongass National Forest and the national perspective on the use of this forest for recreation and tourism.

Most components of a literature review were completed in late FY 1999 and early FY 2000. A review of Tongass tourism trends in 1999 was completed. Further literature review was undertaken in FY 2000, with a draft problem statement being prepared for planned field research.

FY 2000 saw the preparation of survey instrument components covering tourism issues to be part of a resident survey in Southeast Alaska. This survey will be administered following completion of further Office of Management and Budget review. A trend analysis for tourism in Southeast Alaska was also prepared. This analysis was presented at the Bellingham meeting of the Society and Natural Resources Symposium in June 2000, with final write-up expected this calendar year.

A research proposal to undertake community based tourism studies in three Southeast Alaska communities, Haines, Hoonah, and Craig/Klawock was also prepared. The research will focus on community response to tourist activities and the changing use and definition of natural resources that results from these activities. Interviews with community members and with tourism business operators will form the basis of her field studies. Five months of fieldwork in Haines has been completed and work has begun in Hoonah. A field report based on work in Haines will be forthcoming.

11) Project 11. Subsistence Data Gathering and Analysis

Subsistence harvest of fish and wildlife continues to be a key activity in most of the Tongass National Forest. The Alaska National Interest Land Conservation Act (ANILCA) requires the Forest Service to evaluate the impact of its land use actions on subsistence. Additionally, the Federal Subsistence Board has management authority over subsistence hunting and fishing on the Tongass National Forest, and the Forest Service has the main responsibility to collect data needed for management decisions. This long-term project provides for systematic collection and analysis of subsistence data for Tongass National Forest communities.

Harvest assessments were completed for the remaining Prince of Wales communities in FY 2000. Field household interviews in Wrangell and Petersburg were conducted in fall, 2000. The Yakutat Native Association will be providing a harvest assessment for Yakutat in early 2001. Work in these remaining communities will complete this round of harvest assessments in the larger Southeast Alaskan communities. Similar survey work will also need to be undertaken in a number of very small communities to complete this round of data collection; these communities include Elfin Cove, Gustavus, Hyder, Meyers Chuck, Pelican, Port Alexander, and Tenakee Springs. Work in this last set of communities may be undertaken in FY 2001. Harvest assessment data have been included in a statewide Community Profile Database maintained by the Department of Fish and Game. These data are internet accessible.

12) Project 12. Traditional Ecological Knowledge

This project explored Tlingit Indian traditional ecological knowledge of the forest and its resources, with an interest in identifying possible relationships between traditional ecological knowledge and scientific understanding of the forest and of forest processes. A review of existing data sources and limited key respondent interviewing was completed in mid FY 2000. This review identified the more important data sources and a number of TEK themes that might be explored further. Traditional land use and ownership proved to be the most promising area for further research. Contemporary Tlingit and Haida communities are generally located within historic tribal territories, and tribe, clan, and house use of land and natural resources continues to have contemporary importance.

13) Project 13. Social Characteristics of Southeast Alaska Communities, Impact of Forest Management, Southeast Alaska Residents Attitudes and Values

This project examines aspects of the interaction of Southeast Alaska communities with the Tongass National Forest. Most effort in this project has gone into development of the Southeast Alaska resident survey. In late FY 1999 work began with the University of Alaska, Anchorage, Institute for Social and Economic Research (ISER) to develop an appropriate survey instrument and methodology. Regional and TNF staff and a large number of agency cooperators provided comments and suggestions on survey components.

14) Project 14. Product Recovery and Quality from Young-Growth Western Hemlock and Sitka Spruce in Southeast Alaska

Usable wood volume, lumber grades, and mechanical strength were measured for 278 young-growth trees harvested on Prince of Wales Island. Analysis has been completed and a draft publication prepared. The first draft went through internal review. It was decided to change the publication from a station paper to a journal article. A reformatted and revised draft is nearly complete and ready for external review.

15) Project 15. Growth and Yield of Second-Growth Stands developing after Clearcutting on Wetland Soils

The study has been completed and a manuscript is in the review process. Results suggest that growth of young stands on these wetland soil sites closely track those predicted for planning purposes. An unanticipated result of the study was the finding that forests in the Region grow on a much broader spectrum of organic soils than previously recognized.

Action Plan (for items 1 through 15 above):

Monitoring of the Research is planned to continue. This work is completed in cooperation with the Pacific Northwest (PNW) station to address high priority information needs of the Forest. Priority research is intended for implementation of the Forest Plan as well as intended to contribute information for further amendment and revision of the plan. The research results will contribute to substantially strengthen the scientific information base needed to support alternative plan development. The research will contribute to the adaptive management feedback loop for the Forest. This feedback will contribute information to evaluate the current plan direction, design monitoring programs, and adjust future management to better address economic, social and environmental concerns. Continued progress on the ongoing research projects is anticipated.

Goal 4: Effective Public Service

Ensure the acquisition and use of an appropriate corporate infrastructure to enable the efficient delivery of a variety of uses.

Objective 4.a—Improve financial management to achieve fiscal accountability.

Objective 4.b—Improve the safety and economy of USDA Forest Service roads, trails, facilities, and operations and provide greater security for the public and employees.

Objective 4.c—Improve and integrate informational systems, data structures, and information management processes to support cost-efficient program delivery.

Objective 4.d—Improve the skills, diversity, and productivity of the workforce.

Objective 4.e—Ensure equal opportunity in employment practices.

Objective 4.f—Provide appropriate access to National Forest System lands and ensure nondiscrimination in the delivery of all USDA Forest Service programs.

Objective 4.a.

Objective 4.a—Improve financial management to achieve fiscal accountability.

In reference to Objective 4a, the monitoring completed on costs and outputs describes the status of the Forest relative to ensuring effective public service. Significant issues addresses in the monitoring this year included:

Evaluation of the Costs and Outputs of the Forest (discussed in Objective 2.e.).

Objectives 4.b and 4.f

Objective 4.b—Improve the safety and economy of USDA Forest Service roads, trails, facilities, and operations and provide greater security for the public and employees.

Objective 4.f—Provide appropriate access to National Forest System lands and ensure nondiscrimination in the delivery of all USDA Forest Service programs.

In reference to Objectives 4.b and 4.f, the monitoring completed on transportation and recreation describes the status of the Forest relative to ensuring effective public service. Significant issues addresses in the monitoring this year included:

Roads and log transfer facilities (discussed in chapter 3 under Objective 1.a).

Recreation and off road vehicle use (discussed in chapter 3 under Objective 1.a).

Management of the Forest relative to the prescribed Recreation Opportunity Spectrum (discussed in chapter 3 under Objective 2.a).

Appendices

Appendix A

MONITORING QUESTIONS

MONITORING QUESTIONS

Air Quality

Is air quality meeting State and Federal ambient air quality standards?

Biodiversity

Are contiguous blocks of old growth habitat being maintained in a forest-wide system of old growth reserves to support viable and well distributed populations of old growth associated species and subspecies?

Are the effects on biodiversity consistent with those estimated in the Forest Plan?

Are management practices consistent with current knowledge regarding sensitive species conservation (federally listed threatened or endangered species, Alaska Region sensitive species, and State species of special concern)?

Are destructive insect and disease organisms increasing to potentially damaging levels following management activities?

Fish Habitat

Are population trends for Management Indicator Species (MIS) and their relationship to habitat changes consistent with expectations?

Are fish & riparian Standards and Guidelines being implemented?

Are fish & riparian Standards and Guidelines effective in maintaining or improving fish habitat?

Heritage Resources

Are heritage resources Standards and Guidelines being implemented?

Are heritage resources Standards and Guidelines effective in protecting heritage/cultural resources as expected in the Forest Plan?

Karst and Caves

Are karst and cave Standards and Guidelines being implemented?

Are karst and cave Standards and Guidelines effective in protecting the integrity of significant caves and the karst landscape?

Land Management Planning

Is the management of National Forest System lands consistent with management objectives of adjacent lands and their management plans?

Local and Regional Economies

Are the effects on employment and income similar to those estimated in the Forest Plan?

Has the Forest Service worked with local communities to identify and pursue Rural Community Assistance opportunities?

Minerals and Geology

Are the effects of mining activities on surface Forest Plan expectations, as allowed in approved Plans of Operations?

Recreation and Tourism

Are areas of the Forest being managed in accordance with the prescribed Recreation Opportunity Spectrum (ROS) class in Forest-wide Standards & Guidelines?

Is Off Road Vehicle (ORV) use causing, or will it cause, considerable adverse effects on soil, water, vegetation, fish and wildlife, visitors or cultural and historic resources of the Forest?

Research

Have identified high-priority information needs been fulfilled?

Scenery

Are the Standards and Guidelines effective in attaining the adopted Visual Quality Objectives established in the Plan?

Soil and Water

Are the Standards and Guidelines for soil disturbance being implemented?

Are the Standards and Guidelines effective in meeting Alaska Regional Soil Quality Standards?

Are Best Management Practices being implemented?

Are Best Management Practices effective in meeting water quality standards?

Subsistence

Are the effects of management activities on subsistence users in rural Southeast Alaska communities consistent with those estimated in the Forest Plan?

Timber

Are timber harvest activities adhering to applicable timber management standards and guidelines?

Are harvested Forest lands restocked within five years following harvest?

Is the Allowable Sale Quantity (ASQ) consistent with resource information and programmed harvest

Are the Non-Interchangeable Components (NIC) of the allowable sale quantity consistent with actual harvest?

Is the proportional mix of volume in NIC I and NIC II as estimated in the Forest Plan accurate?

Should maximum size limits for harvested areas be continued?

Transportation

Are the Standards and Guidelines used for forest development roads and Log Transfer Facilities effective in limiting the environmental effects to anticipated levels?

Wetlands

Are wetlands Standards and Guidelines being implemented?

Are wetlands Standards and Guidelines effective in minimizing the impacts to wetlands and their associated functions and values?

Wild and Scenic Rivers

Are Wild, Scenic, and Recreational River Standards and Guidelines being implemented?

Are Wild, Scenic, and Recreational River standards effective in maintaining or enhancing the free flowing conditions and outstandingly remarkable values at the classification level for which the river was found suitable for designation as part of the National Wild and Scenic River System?

Wilderness Areas

Are Standards and Guidelines for the management of wilderness being implemented?

Are Standards and Guidelines for the management of wilderness effective in maintaining the wilderness resource?

Wildlife

Are population trends for Management Indicator Species (MIS) and their relationship to habitat changes consistent with expectations?

Are the population levels and associated distribution of mammalian endemic species on islands and portions of the mainland consistent with the estimates in the Forest Plan?

Costs and Outputs

What outputs were produced in the previous year?

Are the costs associated with carrying out the planned management prescriptions (including those of producing outputs) consistent with those costs estimated in Plan?

Appendix B

Best Management Practice Implementation Monitoring Reports

Best Management Practice Implementation Monitoring Report

Background: Implementation of Soil and Water Standards and Guidelines is necessary to maintain soil productivity and water quality. The soil and water Standards and Guidelines are implemented as Best Management Practices (BMPs) described in FSH 2509.22. Region-10 Soil Quality Standards are documented in FSM 2554. Methods for effectiveness monitoring of Soil Quality Standards are referenced in the FSM 2554. Soil conservation practices are practices used to ensure that ground-disturbing activities will meet the R-10 Soil Quality Standards. Typical soil conservation practices include log suspension requirements in timber harvest units and the use of full-bench and end-haul road construction techniques on landslide-prone terrain. Implementation monitoring evaluates whether or not soil conservation practice(s) were required and implemented. Effectiveness monitoring determines whether or not the soil conservation practice used kept the ground-disturbing activity within the R-10 Soil Quality Standard.

The State of Alaska Water Quality Standards set Standards for chemical, physical and biologic parameters of waters on National Forest System Lands. The Forest Service in Region-10 uses Best Management Practices and site-specific prescriptions to meet State of Alaska Water Quality Standards when implementing ground-disturbing activities on National Forest System lands.

The Best Management Practices (BMPs) were monitored on the Tongass National Forest, using guidelines described in the Tongass Monitoring Strategy. The strategy was developed to provide direction for TLMP implementation monitoring. An interagency team of representatives from the Forest Service and Alaska Department of Environmental Conservation selected specific BMPs to be monitored, based upon potential risk factors to soil and water resources. Members of the Monitoring and Evaluation Group (IMEG) then reviewed their selection.

Best Management Practice Implementation

The Best Management Practices (BMPs), described in the Soil and Water Conservation Handbook (Forest Service Handbook 2509.22, October 1996), define practices that protect soil and water resources. The Soil and Water Standards and Guidelines define site-specific measures to protect the resources. These standards and guidelines were monitored following a methodology described in the Tongass Monitoring Strategy. The Strategy was developed to provide direction for Tongass Land Management Plan implementation monitoring.

The BMP implementation monitoring included two distinct efforts: (1) 100 percent monitoring of the units closed out and roads final completed, and (2) Interdisciplinary Team (IDT) monitoring. The 100 percent monitoring was conducted primarily by Forest Service sale administrators and engineering representatives, with assistance from resource specialists in a few circumstances. The IDT Monitoring was conducted by a team of representatives from the Forest Service and other Federal and State agencies; which included sale administrators, engineers, foresters, planners, and resource specialists from soils, water and fisheries. IDT monitoring was conducted on a stratified random sample made up of more than 10 percent of units and roads monitored during the 100 percent monitoring effort. The IDT sample represented 45 percent of the road sites monitored on 37 percent of the different roads, and 17 percent of the units monitored during the 100 percent BMP implementation monitoring effort this year.

The monitoring showed that the Tongass National Forest is implementing the Standards and Guidelines for Soil Disturbance successfully. There were few departures from full implementation that were noted and some corrective action was implemented. In a few cases, following the monitoring, action plans were developed to complete additional work to fully implement the BMP.

Monitoring Context

Planning for some of the roads and units was completed before the Soil and Water Conservation Handbook was revised in October 1996, and new Forest Plan Standards and Guidelines were approved in May 1997. Both documents included many improvements for protecting soil and water resources. Several important changes in the 1996 Soil and Water Conservation Handbook include improving wetlands management direction, considering stream buffer windthrow, and generally making Forest

Service BMPs consistent with State Forest Practices Regulations. A few of the important changes included in the 1997 TLMP FEIS and the revised Forest Plan Standards and Guidelines resulted in new stream class definitions, and stream protection measures required for each stream class and channel type. Buffer strip protection of Class III streams was entirely new.

BMPs Applicable

BMP 12.5 Wetlands Protection Measures
BMP 12.6/ 12.6a Riparian Area Designation & Protection/ Buffer Zone Design and Layout
BMP 12.7/ 14.5/14.8 Measures to Minimize Surface Erosion
BMP 12.8/ 12.9 Oil Pollution Control Measures
BMP 12.17 Revegetation of Disturbed Areas
BMP 13.5 Identification and Avoidance of Unstable Areas
BMP 13.9 Yarding Systems to Protect Soil/ Water Resources
BMP 13.10 Landing Location and Design
BMP 13.11/ 13.14/ 14.5 Erosion Control Measures for Units & Temporary Roads
BMP 13.16 Stream Channel Protection
BMP 14.6 Timing Restrictions for Construction Activities/ Fisheries Prescription
BMP 14.7/14.12 Measures to Minimize Mass Failures/ Control of Excavation & Sidecast
BMP 14.9 Drainage Control Structures to Minimize Erosion & Sedimentation
BMP 14.14/ 14.17 Design & Installation of Bridges and Culverts
BMP 14.18 Control Rock Pit Sediment
BMP 14.20/ 14.22 Road Maintenance Access Management
BMP 14.26/ 14.27 LTF Surface Erosion Control Plan, Storm Water Pollution Prevention Plan

Monitoring Results

100 Percent Monitoring

The 100 percent monitoring effort consisted of monitoring 71 road sites on 35 different roads recorded on 61 forms and 210 units recorded on 165 forms. The IDT monitoring effort consisted of monitoring 35 units and 32 road sites on 13 different roads. This monitoring covered 5364.3 acres of harvest units.

The 100 percent monitoring effort is summarized in table 1. This table displays the total number of times each specific BMP was rated, the number of times it was fully implemented, number of times it showed a departure from full implementation, and the number of times departures from full implementation of BMPs were corrected. In most cases where departures were observed, corrective action was taken so that the BMP was fully implemented before the unit or road was approved by either the sale administrator or contracting officers representative. In a few cases, the monitoring resulted in action plans being drawn up to complete additional work so the BMP would be fully implemented.

Table 1 Summary of Monitored BMP Application, Number of Departures, and Corrective Actions

BMPs Applied	Number of Times the BMP was Appropriate for Use	Number of Departures from BMP Implementation	Number of Times Corrective Action Applied
12.5	89	0	0
12.6/ 12.6a	95	1 (1%)	5 (5%)
12.8/ 12.9	139	0	6 (4%)
12.17	56	1.5 (3%)	6 (11%)
13.5	73	0	0
13.9	157	1 (1%)	3 (2%)
13.10	138	3 (2%)	4 (3%)
13.11/ 13.14/ 14.5	131	1 (1%)	0
13.16	131	2 (2%)	5 (4%)
12.7/ 14.5/ 14.8	41	0	0
14.6	43	0	0
14.7/ 14.12	20	0	0
14.9	37	0	0
14.14/ 14.17	56	2 (4%)	0
14.18	0	0	0
14.20/ 14.22	21	0	0
14.26/ 14.27	81	0	0
	1308	**11.5 (1%)**	**29 (2%)**

Corrective actions were implemented and departures occurred in several BMPs. Corrective actions were implemented 29 times in efforts to fully implement the BMPs or mitigate the effects of the incidents on the soil and water resources. In several of these situations, these corrective actions were effective in facilitating full BMP implementation. Departure from BMP implementation was reported a total of 11.5 times. Summaries of incidents associated with the corrective actions implemented and departures from full BMP implementation are listed below:

BMP 12.6/ BMP 12.6a, Riparian Area Designation and Protection and Buffer Zone Design and Layout; corrective actions were implemented 5 times and departure was reported one time. In one Thorne Bay unit where full BMP implementation was not achieved when several trees were pulled over into a Class II stream buffer with the logging system rigging. In a Ketchikan unit, a departure occurred when a Class I stream was improperly mapped during layout. Stream protection measures were implemented in sale administration. In another Ketchikan unit, a snag was felled across a stream. This tree was removed with minimal disturbance to the stream channel. In two Wrangell units, four streams were not identified in the environmental assessment phase of the project. During sale administration, these Class III & IV streams were identified and protection measures implemented. Corrective action was successful in bringing the units into full compliance where streams were missed during layout. These streams were identified during sale administration and protection measures implemented.

BMP 12.8/ 12.9 Oil Pollution Control Measures; corrective actions were implemented 6 times and no departures were reported. On one Petersburg road, some empty grease cartridges and oil filter was found along the road then upon notice, the cartridges and filter were disposed of properly. Equipment leaks and hydraulic hose leaks occurred, causing minor hydrocarbon contamination to soil and shot rock on one Petersburg road, two Thorne Bay units, one Ketchikan LTF and one Wrangell unit. Absorbents were deployed immediately to soak up any free petroleum products, the leaks were fixed immediately, and contaminated soil removed to proper disposal sites. In Thorne Bay, one site was seeded. The used petroleum absorbents were disposed of properly.

BMP 12.17, Revegetation of Disturbed Areas; corrective actions were implemented 6 times and 1.5 departures were reported. On one Thorne Bay unit a departure occurred in a unit where soil disturbance was caused during yarding; corrective action consisted of seeding the barred soil. On one Thorne Bay unit reviewed by the IDT, a portion of the IDT noted a departure in a shovel yarding unit where a shovel rut exposed barred soil. The other members of the group felt this was not a departure since no water rilling and no soil transport was apparent in the 200 feet long and 4- 8 inch deep rut. Two additional Thorne Bay units showed soil disturbance from yarding. Seeding was implemented as a corrective action. Three Ketchikan units were not seeded at the time of contract closure because the sale was terminated prior to seeding by the Contracting Officer. Due to the contractual situation, the district was planning to seed the 1/10 acre area.

BMP 13.9 Yarding Systems to Protect Soil/ Water Resources; corrective actions were reported 3 times and departure was reported 1 time. On one Thorne Bay unit a departure occurred when soil disturbance was reported associated with unit yarding. On two Wrangell units, Class IV streams were identified in the environmental assessment but not identified in the sale area maps nor on the ground. During contract administration, Class IV streams were not found but instead one wet area. No stream protection measures were necessary in these units.

BMP 13.10 Landing Location and Design; corrective actions were implemented 4 times and 3 departures were reported. On one Ketchikan unit, a departure occurred during layout and administration. In this unit a landing was constructed that did not allow for the required suspension and the landing slash pile was located adjacent to a stream channel. The corrective action recommended was to burn the slash pile to prevent sloughing into the creek. In another Ketchikan unit, a corrective action was implemented to modify the logging system where suspension could not be achieved. The required suspension could not be achieved using the original layout because the unit contained some topographic irregularities that made the areas shady and almost blind. This problem resulted from a road relocation that eliminated the opportunity to build a temporary spur road. On one Thorne Bay unit a departure occurred on minimizing

the clearing excavation, and the associated logging system did not allow the prescribed suspension. Corrective action of seeding the disturbed soil was implemented. On another Thorne Bay unit a departure was reported in a unit where logs were decked across a creek along a steep full bench road. Corrective action included removing most of the logs and tree debris from the creek; leaving some material to prevent damage to the stream banks.

BMP 13.11/ 13.14/ 14.5 Erosion Control Measures for Units & Temporary Roads; no corrective actions were implemented and 1 departures were reported. During the IDT review, a departure was reported one Craig unit during contract administration where a short temporary road was not water barred and closed. This road was not closed because it was very short; approximately 100 feet long and no drainage features or concerns were apparent.

BMP 13.16 Stream Channel Protection; corrective actions were implemented 5 times and 2 departures were reported. On two Ketchikan units departures were reported where trees were felled across streams. In the one unit, two trees were felled across a Class III stream and removed without disturbance to the channel. In the other unit, a snag fell and was bridging a stream above a road. This tree and tree debris was removed with minimum disturbance to the stream channel. On another Ketchikan unit, a few trees were felled into a Class III stream channel. Corrective action included suspending falling operations and removing the trees immediately. No disturbance occurred to the stream channel. On two Wrangell units Class IV streams were identified in the environmental assessment but were not identified on the sale area map nor identified on the ground. The sale administrator corrected these discrepancies, identified the one area as a wet area, and required no stream protection employed.

BMP 14.14/14.17 Design & Installation of Bridges and Culverts; no corrective actions were implemented and 2 departures were reported. On two Hoonah culvert sites reviewed by the IDT departures were reported concerning the lack of fish passage provided by these culverts. The one culvert was installed at a 4% gradient on a Class II stream with a naturally steep gradient. Upstream cutting occurred during installation resulting in a short steep stretch cut to bedrock immediately upstream of the culvert. A steep reach is also shown in the channel immediately downstream of the culvert. The other culvert was installed at a 1% gradient on a Class II stream and head cutting extends roughly 30 feet upstream of the culvert. A 6 feet rock cliff is shown roughly 50 feet upstream of the culvert. Corrective action recommended includes creating a pool at the culvert outlet, armoring the upstream bank with rocks, and placement of gravel and rock in the culvert to dissipate the flow. Corrective actions were also recommended at 10 additional Class II stream sites and 8 Class I stream sites where culverts were replaced on the Hoonah District. These corrective actions are detailed in the Hoonah IDT Monitoring Report.

10 percent IDT Monitoring

Background

A total of 210 units and 71 road sites (on 35 different roads) were monitored this year through the 100% implementation monitoring process. A subset of the total BMP implementation monitoring pool consisting of 35 units and 32 road sites (on 13 different roads) were monitored during the 10% IDT monitoring process. The Interagency Monitoring & Evaluation Group (IMEG) selected the monitoring locations based upon significant aspects of the unit harvest and road construction associated with these areas. The 10% monitoring was completed on five districts in eleven geographic areas and seventeen harvest and road construction areas as listed below:

Craig RD: Polk Inlet (East Polk TS, Whistle Stop TS, Polk culvert), Twelve Mile Arm (East 12 Mile TS), Little Coal Bay (Little Coal Bay TS): monitored 9 units & I culvert site (1 road)
Thorne Bay RD: Naukati- Sarkar (Naukati- Sarkar TS), Steelhead (Big Dewey TS, Steelhead Bridge), North Thorne (North Thorne TS, Control Center TS): monitored 12 units & 2 bridge sites (1 road)
Ketchikan RD: Shoal Cove, Shelter Cove (culverts): monitored 11 culvert sites (7 roads)
Hoonah RD: Whitestone Harbor, Freshwater Bay (culverts): 20 culvert sites (4 roads)
Petersburg RD: Portage Bay (Bohemia TS), Kuiu (Saginaw TS, Crane TS): monitored 14 units

During IDT monitoring the group noted soil, visual, timber, stream and buffer characteristics relative to the management practices. Specifically in shovel logging units, we looked at soil compaction, soil disturbance, slope gradient limitations, and retention. In the helicopter units, we looked at partial retention, soil disturbance, visuals, stream buffers and stream disturbance. In the running skyline and high lead logging, we focused on streams, buffers, and soil disturbance. In the road review, we looked at the reconstruction of the culverts relative to fish passage. A complete summary of this review can be found in the IDT Monitoring Trip reports; *"IMEG IDT Monitoring 2000 Trip Reports" and "IMEG IDT Monitoring Trip Report, Hoonah Ranger District, August 22-23,2000".*

IDT Monitoring Results

Generally 10% quality control monitoring completed by IDT showed agreement with the monitoring completed by the Sale Administrators & Engineering Representatives. Monitoring showed that the Best Management Practices (BMP) were being implemented. There was some discussion as to whether one minor incident that was a departure from BMP implementation caused the entire unit to be rated as a departure for that item. The rating should reflect the significance of the departure and the impact on the soil, water, and timber resources. There was minimal confusion identified on completion of the forms and interpretation of the rating system. The new form format proved to be a significant improvement.

During the IDT monitoring the group noted identified strengths associated with BMP implementation and a few best management practices that need continued emphasis.

Identified strengths of BMP implementation included:
BMP 12.5 Wetlands Protection Measures
BMP 12.6/ 12.6a Riparian Area Designation & Protection/ Buffer Zone Design and Layout
BMP 12.7/ 14.5/ 14.8 Measures to Minimize Surface Erosion
BMP 12.17 Revegetation of Disturbed Areas
BMP 13.5 Identification and Avoidance of Unstable Areas
BMP 13.9 Yarding Systems to Protect Soil/ Water Resources
BMP 13.10 Landing Location and Design
BMP 13.11/ 13.14/ 14.5 Erosion Control Measures for Units & Temporary Roads
BMP 13.16 Stream Channel Protection
BMP 14.6 Timing Restrictions for Construction Activities/ Fisheries Prescription
BMP 14.14/ 14.17 Design & Installation of Bridges and Culverts
BMP 14.26/ 14.27 LTF Surface Erosion Control Plan/ Storm Water Pollution Prevention

Identified emphasis items included:
BMP 12.17 Revegetation of Disturbed Areas
BMP 13.10 Landing Location and Design
BMP 13.11/ 13.14/ 14.5 Erosion Control Measures on Temporary Roads
BMP 14.14/ 14.17 Design & Installation of Bridges and Culverts

Specific Ratings

Specifically examining the ratings from the IDT Implementation Monitoring Trip, a total of thirty-five harvest units were monitored consisting of twenty-one harvest units in the Ketchikan vicinity and fourteen harvest units in the Petersburg vicinity. Only two harvest units monitored by the IDT showed individual partial departures from full BMP implementation. Thirty-two culverts/ bridges were monitored by the IDT team; twenty culverts in the Hoonah vicinity and 12 culverts/ bridges in the Ketchikan vicinity. The twelve culvert/ bridge installations in the Ketchikan vicinity showed full BMP implementation with only a culvert sizing issue raised at one culvert site. Out of the twenty culverts monitored in the Hoonah vicinity, sixteen showed full BMP implementation. Details of the Hoonah trip are included in a separate trip report, *"IMEG IDT Monitoring Trip Report: Hoonah Ranger District, August 22-23 2000."*

The IDT group was split on the two departure ratings because there was a difference of opinion about what constituted a departure. We concluded that the rating system was a tool for communication and that the focus should be on emphasis items. We agreed that the monitoring intent was to ensure resource protection through implementation of the BMPs. Details of the discussion on the strengths associated with the BMP implementation as well as the specific emphasis items are included in tables 2 and 3.

Table 2: Strengths Identified in BMP Implementation During IDT Monitoring in Ketchikan, Thorne Bay, Craig & Petersburg Ranger Districts

BMPs Applied	
BMP 12.5 Wetlands Protection:	Added wetland buffers Boundaries adjusted to avoid wetlands Protected wetlands Wetlands- partial suspension achieved, no vegetative disturbance apparent, moss in place, no ruts No soil disturbance on forested wetlands- achieved full suspension Added stream protection measures on streams identified during layout that were not identified during planning Changed configuration of unit to eliminate wetland Partial suspension achieved in wetlands -no vegetative disturbance in wetlands
BMP 12.6 Riparian Area Buffer/ BMP 12.6a Buffer Zone Design & Layout:	Class I stream buffers intact, added distance for reasonable assurance of windfirm (RAW) Directionally fell trees away from buffers Deleted acres for Class III stream slope buffer + RAW Split yarding, full suspension over stream Class III stream buffer to slope break + RAW Partial suspension over Class IV streams Directional falling to protect stream buffer Added stream buffers on Class I streams missed in design Class III stream buffers intact on O/W, G/W streams Slope break buffer intact on Class III stream No evidence of Class III stream crossing by shovel Buffers on Class I streams intact Class III O/W stream buffer intact Class III stream split yarding & full suspension achieved, no evidence of disturbance Class II TTRA stream buffers intact Class III G/W stream, directional felling, partial suspension implemented effectively Noted map errors; location of streams missed during layout, added stream protection measures during contract Karst buffer added during contract administration Changed unit configuration to add buffer from planned to layout Changed unit boundaries to add buffer on water quality stream Class III slope break buffer intact, directional felling, yarded away from stream Removed tree debris from Class IV streams Class III G/W streams directional felling, debris cleaned from streams Class IV streams directional felling and debris cleaned from streams No disturbance of stream banks of un-buffered Class III & IV streams Trees retained on stream banks although no buffer prescribed per unit retention prescription & to limit impact on streams Class I lake and beaver pond buffers intact Class III streams showed no disturbance on banks, tree debris removed, directional fell trees away from stream courses Wildlife retention areas were intact and showed no disturbance Eliminated road spur to limit access to wildlife retention island Stream buffer intact, Directionally fell trees away from buffers, expanded buffers
BMP 12.8/ 12.9 Oil Pollution Control Measures	SA assured operator to clean-up minor oil concerns No evidence of oil staining & spills No oil spills apparent
BMP 12.7/ 14.5/ 14.8 Measures to Minimize Surface Erosion	Endhauled fill from re-construction of culvert to appropriate disposal area Installed armor rock on inlet
BMP 12.17 Revegetation of Disturbed Areas:	Seeded minor disturbed area; seed growing well
BMP 13.5 Identification & Avoidance of Unstable Areas:	Areas showing high MMI soils on slopes >72% gradient were eliminated from unit during layout Logging system designed to limit yarding on slopes >72% gradient Configuration of unit changed from planned layout to limit harvest on steep slopes and impact on streams Designed logging systems to helicopter log steep areas

BMPs Applied	
BMP 13.9 Yarding Systems to Protect Soil/ Water Resources:	Minimal soil disturbance Partial suspension was achieved in shovel logging Partial suspension achieved on running skyline No soil disturbance apparent Partial suspension achieved in cable yarded unit Partial suspension achieved in forested wetland Full suspension achieved in helicopter logged units No soil disturbance throughout helicopter units Utilized shovel logging with chokers to minimize soil disturbance Minimal soil disturbance, protection measures implemented on un-buffered Class III stream channel
BMP 13.10 Landing Location & Design:	Landing designed successfully for partial suspension Minimize clearing excavation
BMP 13.11/ 13.14/ 14/5 Erosion Control Measures-Units, Temporary Roads:	Shovel tracks covered with slash Shovel trails covered with slash, no evidence of rutting Water bars in place and functional Shovel trails were fluffed and covered with vegetation, no ruts were visible, puncheon removed No disturbance near landings Temporary roads were eliminated ditches cleaned & reseeded where necessary, installed water bars, pulled drainage structures Culverts pulled
BMP 13.16 Stream Channel Protection:	Protected Class III streams, Class IV streams; modified unit protection requirements during layout, added protection for Class IV stream during sale administration Protected Class III streams, Class IV streams Added protection/ clean-out debris on Green & White protected stream
BMP 14.6 Timing Restrictions for Construction Activities/ Fisheries Prescription:	Constructed during timing window Constructed during timing, AFD&G concurrence Timing guidelines met
BMP 14.14/ 14.17 Bridge/ Culvert Design, Installation & Removal:	Hydro-seeded exposed soil slopes to limit erosion Armor rock installed on abutment limiting erosion and protecting the slope Straw bales and settling basin utilized to limit sediment transport in ditch Pulled abutments back from stream course Utilized bedrock to define channel boundaries Culvert replaced on Class II stream; effectively provides hydraulic function and fish passage Banks seeded to limit erosion Culverts hydraulically functioning well and fish passage provided ADF&G concurrence Turbidity measurements completed Grass seed well established Bedload established in pipe Outlet control & plunge pool functional, well defined relative to channel configuration
BMP 14.26/ 14.27 LTF surface erosion Control Plan/ Storm Water Pollution Prevention	LTF, Sort yard & fueling sites in compliance with plans

Table 3: Emphasis Items Identified in BMP Implementation During IDT Monitoring in Ketchikan, Thorne Bay, Craig, & Petersburg Ranger Districts

BMP	Emphasis Item	Recommendation
BMP 12.17 Revegetation of Disturbed Areas	A rut (roughly 200 feet long) was observed in the unit that showed a partial departure. This rut was 4 – 8 inches deep and lain parallel to the slope on a ~20% side slope. The rut showed no signs of water rilling or soil transport.	The rut showed no signs of water rilling or soil transport. The rut was underlain partially by corduroy trees and occurred when the shovel yarder fell off the corduroy when moving through the unit. No substantial impact to the soil or water resources was observed. This rut constituted less than 1% of the unit. No action recommended.
BMP 13.11/ 13.14/ 14.5 Erosion Control measures- Units, Temporary Roads.	A temporary road (approximately 100 feet long) was not closed in the unit that showed a departure. Additional culverts were recommended due to the road grade and the distance between culverts. BMP was fully implemented.	This road was on a flat gradient and adjacent to a pull out on a specified road that was not closed. There were no drainage structures in this road and there was no observed water transport. No substantial impact to the soil or water resources was observed. No signs of erosion or sediment transport were apparent. No action recommended
BMP 14.14/ 14.17 Bridge/ Culvert Design, Installation & Removal	A concern was raised about the sizing of culverts relative to the stream width for this structure. BMP was fully implemented.	The culverts are sized following engineering guidelines based upon flow characteristics and the watershed as well as the Best Management Practices (BMPs) to provide for hydraulic function of the stream and fish passage. In accordance with the BMPs, the width of the stream is not restricted to the extent practicable. This issue will be followed up on by the Forest Service engineering and the hydrology work groups.

Summary: 10% IDT Monitoring

Overall, the sale administrators and engineering representatives demonstrated diligence in implementing appropriate protection of the stream courses, as well as prescribed suspension, effective culvert/ water bar installation, and minimization of sedimentation. The terrain in some of these units was steep, requiring extensive efforts on the part of the sale administrators to implement the BMPs. The sale administrators worked carefully to identify streams missed during the environmental assessments and during layout and follow to implement the appropriate stream protection measures. The sale administrators worked closely with the contractors on some of the shovel units to employ this logging system on relatively steep ground and effectively remove the logs with minimal disturbance to the soils and forested wetlands. Emphasis is continuing to focus on minimizing soil disturbance during yarding operations and associated mitigation covering barred soil with vegetative debris and seeding. Emphasis also continues on BMPs to ensure adequate numbers and spacing of drainage control and relief structures to minimize erosion and sedimentation, road/ ditch maintenance, and seeding of temporary roads.

During completion of the specified roads continued emphasis is being placed on seeding barred soil exposed in road cuts and providing required fish passage at culvert sites. Focus on the design of the culverts specific to the site will be emphasized on sites where the natural stream gradient is relatively high or the stream channel shows stepped banks or gradients upstream or downstream of the crossing sites. At these sites, detailed survey and investigation will be conducted to provide data for stream simulation and specific site designs.

Recommendations: IDT Monitoring

The sale administrators and engineering representatives have a strong understanding of the Best Management Practices (BMPs) and work to implement these BMPs on the ground. The sale administrators, engineering representatives, and contracting officer's representatives have responsibilities for implementation of many of the BMPs through administering the timber sale and public works contracts. They closely inspect these contracts and work with the operators to ensure compliance with many of the BMPs. Through the hard work and diligent efforts of the sale administrators, engineering representatives and contracting officers representatives, the BMPs are implemented on the ground. The IDT monitoring of the Tongass this year shows that the sale administrators, engineering representatives, and contracting officers representatives are consistently implementing these BMPs fully and monitoring them following the same criteria as the IDT. This is a trend that has continued to improve over the past three years till we are nearly at 100% full implementation of the BMPs. We need to consider moving toward monitoring a smaller sub-set of the roads and units.

The IDT recommends focusing on emphasis items rather than the specific rating for the BMP. The group feels that this trip should be a communication opportunity to discuss interpretation of implementation of the BMPs. The group does not feel that it is significant to focus on the specific ratings. The orientation of the group is toward interpretation and implementation rather than a rigorous inspection of detail.

10% IDT Best Management Practices Monitoring Trip: Hoonah

A field trip to the Hoonah Ranger District, on August 22-23, 2000, was conducted as a part of the annual interagency Best Management Practices (BMP) Implementation/Effectiveness Monitoring effort. The purpose behind the Hoonah visit was to inspect culvert replacements to determine if the BMP was implemented correctly, and to determine the effectiveness of the BMP, as applied in a given instance.

Background: Hoonah Culvert Replacements

A 1996 Regional Office activity of Hoonah District system roads identified the need for further study on the effects of culvert design and maintenance on upstream migration. A monitoring project, funded through the Environmental Protection Agency, was initiated in 1997. The objectives of the monitoring project were: Identify physical conditions that impede fish migration at Class I and Class II stream crossings; sample fish above and below stream crossings and estimate area of potential habitat loss associated with road-related migration barriers; and identify maintenance needs and opportunities for restoring access to fish habitat.

Sampling was focused on road segments, identified in previous surveys, as having significant numbers of culverts that restrict upstream fish migration. These included segments of road in the Game Creek, Freshwater Creek, Iyouktug Creek and Pavlof River watersheds on Northwest Chichagof. A summary of the procedures and findings, titled *Fish Passage at Selected Culverts Crossings on the Hoonah District Road System*, was compiled by Chris Riley and Steve Paustian (3/99).

There were 32 stream crossings identified as potential barriers to fish migration. Of these, 13 were identified as Class I streams; all 13 were determined to present actual barriers to movement by adult and/or juvenile anadromous fish. The remaining 19 streams were classified as Class II (containing resident fish). Seventeen of these were determined to barriers to fish migration.

In 1998, plans were made to replace the culverts identified as fish barriers during the field survey. A contract was prepared, using the BMPs, TLMP Standards & Guidelines, and stream crossing construction specifications applicable at the time. The contract period was set to coincide with the "fish window" of June 1 – July 15. Full consultation with ADF&G was entered into, conforming to the conditions of the March 1998 Memorandum of Understanding on in-stream work.

The work under the contract involved removing the existing culvert, replacing it with one of the proper size, and assuring that it was installed to provide fish passage for adults and juvenals. To date, 39 culverts have been replaced under two different contracts, with work occurring in 1998, 1999, and 2000. Work has occurred in the Game Creek, Freshwater Creek, Iyouktug Creek, Pavlof River, and Neka River watersheds. Priorities were the problem barriers identified in the study, and the "worst of the worst" of culverts identified in subsequent surveys.

<u>**Implementation Monitoring Results**</u>

The purpose of the monitoring trip was to look at replacement culverts on existing road systems. The applicable Best Management Practices were 14.6 – Timing Restrictions for Construction Activities and 14.14/14.17 – Bridge/Culvert Design, Installation & Removal. The original culvert locations were determined during the initial road construction. The location was on what had been determined to be the break between Class I or II stream reaches, and the beginning of the Class III segments. This may or may not have been accurate. Several of the culverts had been replaced over the life of the road; however, these replacement pipes did not meet the current criteria of allowing fish passage or for sizing.

The team looked at a total of 20 culvert replacements on four road systems in three large watersheds. The 20 culverts inspected represented 51% of all culverts replaced; the remaining 19 culverts were on road systems that were deemed impractical to access in the time allotted. A complete stream survey was completed on one site (FR 8508, kp 20.10). The results of this survey will be available at a later date.

Of the 20 culverts investigated, two had departures from full BMP implementation, and required corrective action. In addition, three others were installed in compliance with the BMP, but may require some additional work or corrective action. The major problem, encountered during the 1999 work season, was the presence of abnormally high water flows. A combination of heavy snow accumulation, late snow melt,

and heavy rains caused higher-than-normal runoff and stream flow during the "fish window" (June 1 – July 15). Removal of the culverts and the leveling (or bedding) resulted in the surrounding soil to become loosened, which, in turn, resulted in the washing out of the soil. This was a particular problem where the streambed was of alluvial origin, and in areas of very shallow bedrock. This washing sometimes resulted in the formation of headwalls upstream of the culvert. While it was recognized at the time as a problem, it was felt best to proceed during the "fish window", rather than to wait and possibly extend outside the window period. It has since been learned that waivers can be granted for in-stream work outside the window, so this will be a factor in future contracts/replacement work.

A second problem encountered was the use of "typical" installation designs where the site situation was atypical (shallow bedrock, steeper gradients, stream course shifting, differing stream gradient resulting from culvert removal, etc.).

In general, it was found that the replacement pipes were of the proper size for the stream width; there was good application of rock weirs for outlet control; culvert bedding was good, except in the case of 6%+ alluvial channels (excessive head cutting) and channels with shallow bedrock; and, timing of in-stream work conformed to the "fish window". In the last case, the BMP for timing was met, but high flows in June 1999 exacerbated erosion and headcutting, causing non-compliance with BMPs 14.14 and 14.17. Sites where problems were identified, or it was determined that some follow-up was desired, will be revisited in the spring of 2001.

A table included in the complete report in the *"IMEG IDT Monitoring Trip Report, Hoonah Ranger District"* lists the culverts where concerns were identified, and the departure from BMP implementation or problem identified with the installation.

Results and Recommendations: Hoonah IDT Monitoring

The overall results were very good. The majority of the culverts were correctly installed, functioning well, and presented no problem. Approximately 10% of the culvert replacements inspected were generally installed in accordance with the Best Management Practice(s) but had less than desirable results. Primary departure from the BMPs was the use of a "typical" design criteria/standards in atypical situations/conditions. General recommendations are associated with using non-standard designs in steep gradient non-standard sites.

A set of recommendations resulting from this monitoring is listed in the *"IMEG IDT Monitoring Trip Report, Hoonah Ranger District"*. These include recommendations of measures to be applied to all culvert replacements, and to specific atypical situations or circumstances.

Evaluation of Monitoring Results

The 100 percent monitoring effort consisted of monitoring 71 road sites on 35 different roads recorded on 61 forms and 210 units recorded on 165 forms. The IDT monitoring effort consisted of monitoring 35 units and 32 road sites on 13 different roads. This monitoring covered 5364.3 acres of harvest units.

The monitoring showed the Tongass National Forest is implementing the Best Management Practices successfully. There was general agreement between the 100 percent monitoring effort and the 10 percent IDT monitoring effort. There were few departures from full BMP implementation noted, and these departures were in most cases corrected prior to road and unit final inspections.

The Standards and Guidelines for soil disturbance are being implemented during timber sale administration and road construction. The sale administrators and engineers have a strong understanding of the BMPs and actions necessary to implement the associated Standards and Guidelines. Continued emphasis is necessary on adequate culvert installations, ditch dams and water bars, and seeding bared soil slopes. Emphasis is also necessary on limiting shovel yarding ruts and covering ruts with vegetative debris as well as fluffing and seeding ruts. Application of partial suspension and full suspension has contributed to limit soil disturbance.

We provided training as well as technical assistance with BMP relative form interpretation on the Tongass this year as well as changed the monitoring form format. These efforts and the increased experience of the sale administrators with the BMP implementation monitoring contributed to significantly improve our monitoring effort. There was minimal confusion identified on completion of the forms and interpretation of the rating system. Roughly 10% of the units were monitored using the FY 1999 monitoring form so some of the items added or emphasized in FY2000 were not included on all the units. The new form format proved to be a significant improvement over the previous editions. The data reported was significantly more consistent and complete. The inconsistencies on form completion were minor. The primary issues surrounded whether the BMP applied or not to the unit or road. Issues of whether the event occurring relative to the BMP, associated with the corrective actions and departures, constituted less than full implementation. There was general consistency on the rating process on the 100% sample. There were some questions raised on the 10% IDT sample about the monitoring rating system and the specific definition of what constituted a departure. We concluded that the10% IDT monitoring was a tool for communication and that the focus should be on emphasis items.

The IDT observed the sale administrators and engineering representatives have a strong understanding of the Best Management Practices (BMPs) and work to implement these BMPs on the ground. The sale administrators, engineering representatives, and contracting officers representatives have responsibilities for implementation of many of the BMPs through administering the timber sale and public works contracts. They closely inspect these contracts and work with the operators to ensure compliance with many of the BMPs. Through the hard work and diligent efforts of the sale administrators, engineering representatives and contracting officers representatives, the BMPs are implemented on the ground. The IDT monitoring of the Tongass this year shows that the sale administrators, engineering representatives, and contracting officers representatives are consistently implementing these BMPs fully and monitoring them following the same criteria as the IDT. This is a trend that has continued to improve over the past three years till we are nearly at 100% full implementation of the BMPs. We need to consider moving toward monitoring a smaller sub-set of the roads and units.

Recommendations follow to change the monitoring process and monitoring form. Suggestions include that the IDT monitoring be accomplished through a duel effort with a smaller IDT team and a larger staff IDT group. Individuals with logging system expertise and road construction expertise need to be included in these groups. Recommendations specific to the form include changing the monitoring rating system and simplifying the form. Other monitoring, inspection, and functional assistance trips should be utilized to collect monitoring information and fill out monitoring forms.

Appendix C

IMEG Monitoring 2000 Trip Report – Craig, Ketchikan, Thorne Bay, and Petersburg Ranger Districts

Introduction

Listed below is work completed during the annual IMEG IDT implementation monitoring trips conducted August and September. This TLMP monitoring effort was completed as 10% quality control implementation monitoring. Implementation of the Best Management Practices are completed on 100% of the units and roads by the Sale Administrators (SA) and Engineering Representatives (ER)/ Contracting Officer's Representatives (COR) during timber sale and public works contract administration.

During this monitoring effort the IDT team filled out the same monitoring forms filled out by the SA and ER/COR. Through comparison and discussion, strengths of Best Management Practices (BMPs) and Standard & Guides (S&Gs) implementation were highlighted as well as areas where we need continued emphasis. Overall, the Forest has demonstrated that we are implementing the Best Management Practices and Standards & Guidelines. The SAs and ER/CORs are effectively implementing the Best Management Practices and Standards & Guidelines. This monitoring effort provided the opportunity to clarify what specific BMPs reference and provide interpretation on application of the form used to document implementation monitoring.

A total of 210 units and 71 road sites (on 35 different roads) were monitored this year through the 100% implementation monitoring process. A subset of 35 units and 32 road sites (on 13 different roads) were monitored during the 10% IDT monitoring process. The 10% monitoring was completed on five districts in eleven geographic areas and seventeen harvest and road construction areas as listed below:

Craig RD: Polk Inlet (East Polk TS, Whistle Stop TS, Polk culvert), Twelve Mile Arm (East 12 Mile TS), Little Coal Bay (Little Coal Bay TS)
Thorne Bay RD: Naukati- Sarkar (Naukati- Sarkar TS), Steelhead (Big Dewey TS, Steelhead Bridge), North Thorne (North Thorne TS, Control Center TS)
Ketchikan RD: Shoal Cove, Shelter Cove (culverts)
Hoonah RD: Whitestone Harbor, Freshwater Bay (culverts)
Petersburg RD: Portage Bay (Bohemia TS), Kuiu (Saginaw TS, Crane TS)

The monitoring locations were selected on Districts, which were not visited in the previous year utilizing a stratified random process. This stratified random process focused the selection where management activities occurred in locations with a high concentration of streams and steep slope gradients. Additional criteria included logging practices that used methods that were less conventional: shovel logging and helicopter logging. The road review focused on culvert replacement on streams designated through the road condition survey process as needing improvement for fish passage.

During IDT monitoring the group noted soil, visual, timber, stream and buffer characteristics relative to the management practices. Specifically in shovel logging units, we looked at soil compaction, soil disturbance slope gradient limitations, and retention. In the helicopter units, we looked at partial retention, soil disturbance, visuals, stream buffers and stream disturbance. In the running skyline and high lead logging, we focused on streams, buffers, and soil disturbance. In the road review, we looked at the reconstruction of the culverts relative to fish passage.

The prework focused on detailed review of the planning, contract administration documents, and maps associated with specific units and roads selected for IDT review. The monitoring group filled out portions of the monitoring forms from reviewing NEPA documents associated with each timber sale, planning unit and road cards, sale area maps, wetland soils maps, GIS topographic maps that illustrated the road, units, logging systems and stream classes. The field portion of the monitoring was conducted over a period of a month due to weather and logistical time associated with monitoring units and roads located in different geographical areas with remote access.

Prework was held prior to the field review in Ketchikan on August 21- 22 for the Ketchikan, Petersburg on August 21 and Hoonah on August 23. Specifically the dates field work was completed are listed below:

Thorne Bay RD	August 22-23, September 5
Craig RD	August 24, September 7-8, September 15
Ketchikan RD	August 25
Hoonah RD	August 23-24
Petersburg RD	August 28-31

Summary of Monitoring Results

Generally 10% quality control monitoring completed by IDT showed agreement with the monitoring completed by the Sale Administrators & Engineering Representatives. Monitoring showed that the Best Management Practices (BMP) were being implemented. There was some discussion as to whether one minor incident that was a departure from BMP implementation caused the entire unit to be rated as a departure for that item. The rating should reflect the significance of the departure and the impact on the soil, water, and timber resources. There was minimal confusion identified on completion of the forms and interpretation of the rating system. The new form format proved to be a significant improvement.

During the IDT monitoring the group noted identified strengths associated with BMP implementation and a few best management practices that need continued emphasis.

Identified strengths of BMP implementation included:
BMP 12.5 Wetlands Protection Measures
BMP 12.6/ 12.6a Riparian Area Designation & Protection/ Buffer Zone Design and Layout
BMP 12.8/ 12.9 Oil Pollution Control Measures
BMP 12.17 Revegetation of Disturbed Areas
BMP 13.5 Identification and Avoidance of Unstable Areas
BMP 13.9 Yarding Systems to Protect Soil/ Water Resources
BMP 13.10 Landing Location and Design
BMP 13.11/ 13.14/ 14.5 Erosion Control Measures for Units & Temporary Roads
BMP 13.16 Stream Channel Protection
BMP 14.6 Timing Restrictions for Construction Activities/ Fisheries Prescription
BMP 14.14/ 14.17 Design & Installation of Bridges and Culverts

Identified emphasis items included:
BMP 12.7/ 14.5/ 14.8 Measures to Minimize Surface Erosion
BMP 12.17 Revegetation of Disturbed Areas
BMP 13.10 Landing Location and Design
BMP 13.11/ 13.14/ 14.5 Erosion Control Measures on Temporary Roads
BMP 14.14/ 14.17 Culvert Design/ Installation & Removal

High quality work on the part of the sale administrators and layout crews was noted in identifying streams and adding implementation of stream course protection measures for streams that were missed in the planning and layout phases of unit preparation. Extraordinary work was completed on the part of the sale administrators in working with shovel operators to limit soil disturbance and keep retention trees in shovel logging units. Little evidence of the shovel yarder was apparent and in some of the shovel units no soil disturbance was apparent. The sale administrators have worked with the operators to remove puncheon, fluff soil and cover shovel tracks with tree debris in an effort to minimize soil erosion. Through diligent contract administration efforts, the sale administrators have worked with the operators to retain trees throughout the helicopter units, particularly on the stream banks of un-buffered water quality streams. The sale administrators added buffers and protection measures for Class III and also protection measures for Class IV streams. Emphasis will continue on identifying streams missed during sale preparation, seeding temporary roads, ensuring water bars are functional; and seeding, slash covering, and avoidance of ruts associated with shovel logging.

High quality work on the part of the contracting officers representatives was shown during the monitoring of the culvert replacements. The culverts were installed to provide hydraulic function and fish passage. Some construction included rip-rap and armor rock to protect slopes from erosion. The contract administrators worked with the operator to ensure construction of plunge pools fit the configuration of the channels and were functional for fish passage. The contract administrator worked diligently with ADF&G to obtain ADF&G concurrence on all fish structures. Emphasis is focused on minimizing stream restriction. During completion of the roads and post haul maintenance, continued emphasis is being placed on BMPs to ensure adequate numbers and spacing of cross drainage ditches and water bars to minimize erosion & sedimentation and seeding.

Specific Ratings

Specifically examining the ratings from the IDT Implementation Monitoring Trip, a total of thirty-five harvest units were monitored consisting of twenty-one harvest units in the Ketchikan vicinity and fourteen harvest units in the Petersburg vicinity. Only two harvest units monitored by the IDT showed individual partial departures from full BMP implementation. Thirty-two culverts/ bridges were monitored by the IDT team; twenty culverts in the Hoonah vicinity and 12 culverts/ bridges in the Ketchikan vicinity. The twelve culvert/ bridge installations in the Ketchikan vicinity showed full BMP implementation with only a culvert sizing issue raised at one culvert site. Out of the twenty culverts monitored in the Hoonah vicinity, sixteen showed full BMP implementation. Details of the Hoonah trip are included in a separate trip report, *"Best Management Practices Monitoring Trip: Hoonah Ranger District, August 22-23 2000."*

The IDT group was split on the two departure ratings because there was a difference of opinion about what constituted a departure. A few members of the group felt that any departure from BMP implementation constituted a departure from full implementation no matter the scale of the departure. Other members of the IDT felt that the entire unit and the impact of the departure on the soil, water, and timber resources needed to be considered. The second group felt considering the scale and resource impact, the observed problem did not constitute a departure. We concluded that the rating system was a tool for communication and that the focus should be on emphasis items. We agreed that the monitoring intent was to ensure resource protection through implementation of the BMPs. Details of the discussion on the strengths associated with the BMP implementation as well as the specific emphasis items are included in the following tables.

Strengths Identified in BMP Implementation

BMPs Applied	
BMP 12.5 Wetlands Protection:	Added wetland buffers Boundaries adjusted to avoid wetlands Protected wetlands Wetlands- partial suspension achieved, no vegetative disturbance apparent, moss in place, no ruts No soil disturbance on forested wetlands- achieved full suspension Added stream protection measures on streams identified during layout that were not identified during planning Changed configuration of unit to eliminate wetland Partial suspension achieved in wetlands -no vegetative disturbance in wetlands
BMP 12.6 Riparian Area Buffer/ BMP 12.6a Buffer Zone Design & Layout:	Class I stream buffers intact, added distance for reasonable assurance of windfirm (RAW) Directionally fell trees away from buffers Deleted acres for Class III stream slope buffer + RAW Split yarding, full suspension over stream Class III stream buffer to slope break + RAW Partial suspension over Class IV streams Directional falling to protect stream buffer Added stream buffers on Class I streams missed in design Class III stream buffers in tact on O/W, G/W streams Slope break buffer intact on Class III stream No evidence of Class III stream crossing by shovel Buffers on Class I streams intact Class III O/W stream buffer intact Class III stream split yarding & full suspension achieved, no evidence of disturbance Class II TTRA stream buffers intact Class III G/W stream, directional felling, partial suspension implemented effectively Noted map errors; location of streams missed during layout, added stream protection measures during contract Karst buffer added during contract administration Changed unit configuration to add buffer from planned to layout Changed unit boundaries to add buffer on water quality stream Class III slope break buffer intact, directional felling, yarded away from stream Removed tree debris from Class IV streams Class III G/W streams directional felling, debris cleaned from streams Class IV streams directional felling and debris cleaned from streams No disturbance of stream banks of un-buffered Class III & IV streams Trees retained on stream banks although no buffer prescribed per unit retention prescription & to limit impact on streams Class I lake and beaver pond buffers intact Class III streams showed no disturbance on banks, tree debris removed, directional fell trees away from stream courses Wildlife retention areas were intact and showed no disturbance Eliminated road spur to limit access to wildlife retention island Stream buffer intact, Directionally fell trees away from buffers, expanded buffers
BMP 12.8/ 12.9 Oil Pollution Control Measures	SA assured operator to clean-up minor oil concerns No evidence of oil staining & spills No oil spills apparent
BMP 12.7/ 14.5/ 14.8 Measures to Minimize Surface Erosion	Endhauled fill from re-construction of culvert to appropriate disposal area Installed armor rock on inlet
BMP 12.17 Revegetation of Disturbed Areas:	Seeded minor disturbed area; seed growing well
BMP 13.5 Identification & Avoidance of Unstable Areas:	Areas showing high MMI soils on slopes >72% gradient were eliminated from unit during layout Logging system designed to limit yarding on slopes >72% gradient Configuration of unit changed from planned layout to limit harvest on steep slopes and impact on streams Designed logging systems to helicopter log steep areas

BMPs Applied	
BMP 13.9 Yarding Systems to Protect Soil/ Water Resources:	Minimum soil disturbance Partial suspension was achieved in shovel logging Partial suspension achieved on running skyline No soil disturbance apparent Partial suspension achieved in cable yarded unit Partial suspension achieved in forested wetland Full suspension achieved in helicopter logged units No soil disturbance throughout helicopter units Utilized shovel logging with chokers to minimize soil disturbance Minimal soil disturbance, protection measures implemented on un-buffered Class III stream channel
BMP 13.10 Landing Location & Design	Landing designed successfully for partial suspension Minimize clearing excavation
BMP 13.11/ 13.14/ 14/5 Erosion Control Measures- Units, Temporary Roads:	Shovel tracks covered with slash Shovel trails covered with slash, no evidence of rutting Water bars in place and functional Shovel trails were fluffed and covered with vegetation, no ruts were visible, puncheon removed No disturbance near landings Temporary roads were eliminated Ditches cleaned & reseeded where necessary, installed water bars, pulled drainage structures Culverts pulled
BMP 13.16 Stream Channel Protection:	Protected Class III streams, Class IV streams; modified unit protection requirements during layout, added protection for Class IV stream during sale administration Protected Class III streams, Class IV streams Added protection/ clean-out debris on Green & white protected stream
BMP 14.6 Timing Restrictions for Construction Activities/ Fisheries Prescription:	Constructed during timing window Constructed during timing, AFD&G concurrence Timing guidelines met
BMP 14.14/ 14.17 Bridge/ Culvert Design, Installation & Removal:	Hydro-seeded exposed soil slopes to limit erosion Armor rock installed on abutment limiting erosion and protecting the slope Straw bales and settling basin utilized to limit sediment transport in ditch Pulled abutments back from stream course Utilized bedrock to define channel boundaries Culvert replaced on Class II stream; effectively provides hydraulic function and fish passage Banks seeded to limit erosion Culverts hydraulically functioning well and fish passage provided ADF&G concurrence Turbidity measurements completed Grass seed well established Bedload established in pipe Outlet control & plunge pool functional, well defined relative to channel configuration
BMP 14.26/ 14.27 LTF surface erosion Control Plan/ Storm Water Pollution Prevention	LTF, Sort yard & fueling sites in compliance with plans

Emphasis Items Identified in BMP Implementation

BMP	Emphasis Item	Recommendation
BMP 12.17 Revegetation of Disturbed Areas.	A rut (roughly 200 feet long) was observed in the unit that showed a partial departure. This rut was 4 – 8 inches deep and lain parallel to the slope on a ~20% side slope. The rut showed no signs of water rilling or soil transport.	The rut showed no signs of water rilling or soil transport. The rut was underlain partially by corduroy trees and occurred when the shovel yarder fell off the corduroy when moving through the unit. No substantial impact to the soil or water resources was observed. This rut constituted less than 1% of the unit. No action recommended.
BMP 13.11/ 13.14/ 14.5 Erosion Control measures- Units, Temporary Roads.	A temporary road (approximately 100 feet long) was not closed in the unit that showed a departure.	This road was on a flat gradient and adjacent to a pull out on a specified road that was not closed. There were no drainage structures in this road and there was no observed water transport. No substantial impact to the soil or water resources was observed.
BMP 14.14/ 14.17 Bridge/ Culvert Design, Installation & Removal	A concern was raised about the sizing of culverts relative to the stream width for this structure. BMP was fully implemented.	The culverts are sized following engineering guidelines based upon flow characteristics and the watershed as well as the Best Management Practices (BMPs) to provide for hydraulic function of the stream and fish passage. In accordance with the BMPs, the width of the stream is not restricted to the extent practicable. This issue will be followed up on by the Forest Service engineering and the hydrology work groups.
BMP 13.11/ 13.14/ 14.5 Erosion Control measures- Units, Temporary Roads	Additional culverts were recommended due to the road grade and the distance between culverts. BMP was fully implemented.	No signs of erosion or sediment transport were apparent. No action recommended

Thorne Bay Ranger District:

Participants:
Carol Seitz Warmuth (Tongass Monitoring Coordinator), Dennis Landwehr (Thorne Bay & Craig Soil Scientist), Kevin Hanley (ADEC), Steve Brockman (FWS), Maria Dudzak (Tongass Hydrologist), John Gier (Tongass & Ketchikan Soil Scientist), Jim Stittgen (Thorne Bay SA), Kim Redmond (Thorne Bay SA), Tom Marks (Thorne Bay TMA)

Thorne Bay RD monitored: Naukati- Sarkar (Naukati- Sarkar TS), Steelhead (Big Dewey TS, Steelhead Bridges), North Thorne (North Thorne TS, Control Center TS) for a total of 12 units, and 2 bridge sites (1 road).

Naukati- Sarkar: units 554-215, 571-210, 571-209, 571-235, 571-267

Big Dewey: units 588-212, 588-212B, 587-212, 587-212B

Steelhead Bridges: road 2030000 MP 0.81 & MP 0.31

North Thorne: unit 578-404

Control Center: units 595-416, 595-419

Monitoring Results:

Listed below are some of the monitoring observations made by the IDT. These notes are designated into two categories: strengths and emphasis items.

Strengths identified:

North Thorne

BMP 12.5 Wetlands Protection:
Partial suspension achieved in wetlands
Added wetland buffer

BMP 12.6 Riparian Area Buffer/ BMP 12.6a Buffer Zone Design & Layout:
Class I stream buffer intact, added distance for reasonable assurance of windfirm (RAW)
Directionally fell trees away from buffers

BMP 13.9 Yarding Systems to Protect Soil/ Water Resources:
Minimal soil disturbance

Control Center

BMP 13.9 Yarding Systems to Protect Soil/ Water Resources:
Minimal soil disturbance

BMP 12.6 Riparian Area Buffer/ BMP 12.6a Buffer Zone Design & Layout:
Deleted acres for Class III stream slope buffer + RAW
Split yarding, full suspension over stream
Class III stream buffer to slope break + RAW
Partial suspension over Class IV streams

BMP 12.5 Wetlands Protection:
Boundaries adjusted to avoid wetlands

BMP 12.8/ 12.9 Oil Pollution Control Measures
SA assured operator to clean-up minor oil concerns

Big Dewey

BMP 12.5 Wetlands Protection:
Protected wetlands

BMP 12.6 Riparian Area Buffer/ BMP 12.6a Buffer Zone Design & Layout:
Class I stream buffer intact
Directional falling to protect stream buffer
Added stream buffers on Class I streams missed in design

BMP 12.8/ 12.9 Oil Pollution Control Measures
No evidence of oil staining & spills

BMP 13.9 Yarding Systems to Protect Soil/ Water Resources:
Partial suspension was achieved in shovel logging

BMP 13.11/14 Erosion Control Measures:
Shovel tracks covered with slash

Naukati- Sarkar

BMP 12.5 Wetlands Protection:
Wetlands- partial suspension achieved, no vegetative disturbance apparent, moss in place, no ruts

BMP 12.6 Riparian Area Buffer/ BMP 12.6a Buffer Zone Design & Layout:
Class III stream buffers in tact on O/W, G/W streams
Slope break buffer intact on Class III stream
No evidence of Class III stream crossing by shovel
Buffers on Class I streams intact
Class III O/W stream buffer intact
Class III stream split yarding & full suspension achieved, no evidence of disturbance
Class II TTRA stream buffers intact
Class III G/W stream, directional felling, partial suspension implemented effectively
Noted map errors; location of streams missed during layout, added stream protection measures during contract
Karst buffer added during contract administration
Changed unit configuration to add buffer from planned to layout
Changed unit boundaries to add buffer on water quality stream

BMP 13.9 Yarding Systems to Protect Soil/ Water Resources:
Partial suspension achieved on running skyline

BMP 13.10 Landing Location & Design
Landing designed successfully for partial suspension

BMP 13.11/14 Erosion Control Measures: Units & Temporary Roads
Shovel trails covered with slash, no evidence of rutting
Water bars in place and functional

BMP 13.5 Identification & Avoidance of Unstable Areas:
Areas showing high MMI soils on slopes >72% gradient were eliminated from unit during layout
Logging system designed to limit yarding on slopes >72% gradient

Steelhead Bridge & Steelhead Tributary Bridge (Road 2030000 MP 0.31, 0.81)

BMP 14.6 Timing Restrictions for Construction Activities/ Fisheries Prescription:
Constructed during timing window

BMP 14.14/ 14.17 Bridge/ Culvert Design, Installation & Removal:
Hydro-seeded exposed soil slopes to limit erosion
Armor rock installed on abutment limiting erosion and protecting the slope
Straw bales and settling basin utilized to limit sediment transport in ditch
Pulled abutments back from stream course
Utilized bedrock to define channel boundaries

Emphasis items:

Big Dewey

BMP 12.17 Revegetation of Disturbed Areas
Need to fluff and cover shovel and equipment tracks in unit- no evidence of water rilling or transport apparent in rut. Recommend seeding, slash covering, and avoidance of shovel ruts.

Nakauti- Sarkar

BMP 12.7/ 14.5/ 14.8 Measures to Minimize Surface Erosion
Specified road needs seeding
Ditch drainage and ditch blocks on specified road are not functional- recommend adjust road gradient for water flow, need to add additional culverts and ditch blocks

BMP 13.11/14 Erosion Control Measures: Units & Temporary Roads
Temp roads need cut slope seeding
Minor slide on road cut following unit closeout- recommend seeding exposed soil slopes; particularly till and glacial soils
Exposed soil slopes on temp road- recommend seeding
One ditch length on a temporary road and a few cross drains are not functional during low flows; need to improve ditch blocks and water bars to ensure drainage is functional in situations where sources of water and sediment are not observed

BMP 13.10 Landing Location & Design
One minor slides below unit landing potentially caused by sidecast on landing following unit closeout- recommend pull back sidecast after harvest

Steelhead Bridge & Steelhead Tributary Bridge

BMP 12.7/ 14.5/ 14.8 Measures to Minimize Surface Erosion
Straw bales should be located on down stream of culvert to intercept sediment from culvert in addition to sediment from road ditch

Craig Ranger District

Participants:
Carol Seitz Warmuth (Tongass Monitoring Coordinator), Dennis Landwehr (Thorne Bay & Craig Soil Scientist), Kevin Hanley (ADEC), Steve Brockman (FWS), Maria Dudzak (Tongass Hydrologist), John Gier (Tongass & Ketchikan Soil Scientist), Paul Coffey (Craig SA), Gary Barlow (Craig TMA), Dale Kanen (Craig District Ranger), Bill Goodman (Craig Hydrologist), John Hannon (Craig Fish Biologist), Roy Clark (Craig SA)

Craig RD monitored: Polk Inlet (East Polk TS, Whistle Stop TS, Polk culvert), Twelve Mile Arm (East 12 Mile TS), Little Coal Bay (Little Coal Bay TS) for a total of 9 units and 1 culvert site (1 road).

East Polk: 620-325

Whistle Stop: Whistle Stop #1

Polk Culvert: 2100000 MP 2.07

East 12 Mile: 613-210, 613-211, 613-221, 613-241, 613-242

Little Coal Bay: 612-222, 613-270

Monitoring Results:

Listed below are some of the monitoring observations made by the IDT. These notes are designated into two categories: strengths and emphasis items.

Strengths identified:

East Polk & Whistle Stop

BMP 13.5 Identification & Avoidance of Unstable Areas:
Configuration of unit changed from planned layout to limit harvest on steep slopes and impact on streams

BMP 12.6 Riparian Area Buffer/ BMP 12.6a Buffer Zone Design & Layout:
Class III slope break buffer intact, directional felling, yarded away from stream
Removed tree debris from Class IV streams
Class I stream buffer intact

BMP 13.9 Yarding Systems to Protect Soil/ Water Resources: No soil disturbance apparent
Partial suspension achieved in cable yarded unit
Partial suspension achieved in forested wetland

East 12 Mile

BMP 13.9 Yarding Systems to Protect Soil/ Water Resources:
Full suspension achieved in helicopter logged units
No soil disturbance throughout helicopter units

BMP 13.5 Identification & Avoidance of Unstable Areas:
Designed logging systems to helicopter log steep areas

BMP 12.6 Riparian Area Buffer/ BMP 12.6a Buffer Zone Design & Layout:
Class III O/W stream buffers intact
Class III G/W streams directional felling, debris cleaned from streams
Class IV streams directional felling and debris cleaned from streams

No disturbance of stream banks of un-buffered Class III & IV streams
Trees retained on stream banks although no buffer prescribed per unit retention prescription & to limit impact on streams

BMP 12.5 Wetlands Protection:
No soil disturbance on forested wetlands- achieved full suspension
Added stream protection measures on streams identified during layout that were not identified during planning

Little Coal Bay

BMP 12.5 Wetlands Protection:
Changed configuration of unit to eliminate wetland
Partial suspension achieved in wetlands- no vegetative disturbance in wetlands

BMP 12.6 Riparian Area Buffer:/ BMP 12.6a Buffer Zone Design & Layout:
Class I stream buffers intact, windfirm
Class I lake and beaver pond buffers intact
Class III streams showed no disturbance on banks, tree debris removed, directional fell trees away from stream courses
Wildlife retention areas were intact and showed no disturbance
Eliminated road spur to limit access to wildlife retention island

BMP 12.17 Revegetation of Disturbed Areas:
Seeded minor disturbed area; seed growing well

BMP 13.9 Yarding Systems to Protect Soil/ Water Resources:
Utilized shovel logging with chokers to minimize soil disturbance

BMP 13.11/14 Erosion Control Measures: Units & Temporary Roads
Shovel trails were fluffed and covered with vegetation, no ruts were visible, puncheon removed
No disturbance near landings
Temporary roads were eliminated

Polk Culvert (Road 2100000 MP 2.07)

BMP 14.14/ 14.17 Bridge/ Culvert Design, Installation & Removal:
Culvert replaced on Class II stream; effectively provides hydraulic function and fish passage
Banks seeded to limit erosion

BMP 12.8/ 12.9 Oil Pollution Control Measures
No oil spills apparent

BMP 14.6 Timing Restrictions for Construction Activities/ Fisheries Prescription:
Constructed during timing, AFD&G concurrence

BMP 12.7/ 14.5/ 14.8 Measures to Minimize Surface Erosion
Endhauled fill from re-construction of culvert to appropriate disposal area
Installed armor rock on inlet

Emphasis items:

East Polk

BMP 13.11/14 Erosion Control Measures: Units & Temporary Roads
Sidecasting fill on steep slopes should be avoided for landings to limit landslide potential
Sidecast fills should be pulled back after unit close-out to limit landslide potential
Short 100 feet temporary roads should be closed before the unit is final closed-out

Polk Culvert (Road 2100000 MP 2.07)

BMP 14.14/ 14.17 Bridge/ Culvert Design, Installation & Removal:
Ensure hydraulic function and fish passage is provided on culvert structures, stream width constrictions should be minimized

Ketchikan Ranger District

Participants:
Carol Seitz Warmuth (Tongass Monitoring Coordinator), Cameron Thomas (Ketchikan Fish Biologist), John Weisz (Tongass COR), Jack Gustafson (ADF&G), Kevin Hanley (ADEC), Steve Brockman (FWS), John Gier (Tongass & Ketchikan Soil Scientist)

Ketchikan RD: Shoal Cove, Shelter Cove (culverts) for a total of 11 culvert sites (7 roads).

Shoal Cove:	8435000 MP 36.19
	8400000 MP 33.77, MP 28.58
	8444000 MP 0.12, MP 0.17
	8440000 MP 2.15
Shelter Cove:	8330000 MP3.12, MP 3.22
	8300000 MP 17.16
	8340000 MP 1.04, MP 2.38

Strengths identified:

Shoal Cove Culverts

BMP 14.14/ 14.17 Bridge/ Culvert Design, Installation & Removal:
Culverts hydraulically functioning well and fish passage provided
ADF&G concurrence
Turbidity measurements completed
Grass seed well established
Bedload established in pipe
Outlet control & plunge pool functional, well defined relative to channel configuration

BMP 14.6 Timing Restrictions for Construction Activities/ Fisheries Prescription:
Timing guidelines met

Shelter Cove Culverts

BMP 14.14/ 14.17 Bridge/ Culvert Design, Installation & Removal:
Culverts hydraulically functioning well and fish passage provided
ADF&G concurrence
Turbidity measurements completed
Grass seed well established
Bedload established in pipe
Outlet control & plunge pool functional, well defined relative to channel configuration

BMP 14.6 Timing Restrictions for Construction Activities/ Fisheries Prescription:
Timing guidelines met

Emphasis Items: none

Petersburg Ranger District:

Participants:
Rich Jennings (Petersburg RD Monitoring Coordinator), Jim Cariello (ADF&G Fish Biologist), Teresa Streuli (Petersburg SA), Ted Sandhofer (Petersburg SA)

Petersburg RD monitored: Portage Bay (Bohemia TS), Kuiu (Saginaw TS, Crane TS) for a total of 14 units

Bohemia: units 516, 515, 513S, 512, 514

Saginaw: units 399-16, 399-17, 399-18

Crane: units 420-46, 420-47, 420-48, 421-49, 421-50, 421-51

Monitoring Results:

Listed below are some of the monitoring observations made by the IDT. These notes are designated into two categories: strengths and emphasis items.

Strengths identified:

Bohemia

BMP 12.5 Wetlands Protection:
Partial suspension achieved in wetlands
Added wetland buffer

BMP 12.6 Riparian Area Buffer/ BMP 12.6a Buffer Zone Design & Layout:
Stream buffer intact, Directionally fell trees away from buffers, expanded buffers

BMP 13.9 Yarding Systems to Protect Soil/ Water Resources:
Minimal soil disturbance, protection measures implemented on un-buffered Class III stream channel

BMP 13.10 Landing Location & Design:
Minimize clearing excavation

BMP 13.11/ 13.14/ 14/5 Erosion Control Measures- Units, Temporary Roads:
ditches cleaned & reseeded where necessary, installed water bars, pulled drainage structures

BMP 13.16 Stream Channel Protection:
Protected Class III streams, Class IV streams; modified unit protection requirements during layout, added protection for Class IV stream during sale administration

BMP 14.26/ 14.27 LTF surface erosion Control Plan/ Storm Water Pollution Prevention
LTF, Sort yard & fueling sites in compliance with plans

Saginaw

BMP 12.5 Wetlands Protection:
Protected wetlands

BMP 13.9 Yarding Systems to Protect Soil/ Water Resources:
Minimal soil disturbance

BMP 13.10 Landing Location & Design:
Minimize clearing excavation

BMP 13.11/ 13.14/ 14.5 Erosion Control Measures- Units, Temporary Roads

BMP 13.16 Stream Channel Protection:
Protected Class III streams, Class IV streams

Crane

BMP 12.5 Wetlands Protection:
Protected wetlands

BMP 13.9 Yarding Systems to Protect Soil/ Water Resources:
Minimal soil disturbance

BMP 13.10 Landing Location & Design:
Minimize clearing excavation

BMP 13.11/ 13.14/ 14.5 Erosion Control Measures- Units, Temporary Roads
Culverts pulled

BMP 13.16 Stream Channel Protection:
Protected Class III streams, Class IV streams, added protection/ clean-out on Green & white protected stream, cleaned debris from green & white protected channels

Emphasis Item:

Bohemia

BMP 13.11/ 13.14/ 14.5 Erosion Control Measures- Units, Temporary Roads
Need additional culverts due to road grade and distance between culverts

Recommendations:

The IDT observed the sale administrators and engineering representatives have a strong understanding of the Best Management Practices (BMPs) and work to implement these BMPs on the ground. The sale administrators, engineering representatives, and contracting officers representatives have responsibilities for implementation of many of the BMPs through administering the timber sale and public works contracts. They closely inspect these contracts and work with the operators to ensure compliance with many of the BMPs. Through the hard work and diligent efforts of the sale administrators, engineering representatives and contracting officers representatives, the BMPs are implemented on the ground. The IDT monitoring of the Tongass this year shows that the sale administrators, engineering representatives, and contracting officers representatives are consistently implementing these BMPs fully and monitoring them following the same criteria as the IDT. This is a trend that has continued to improve over the past three years till we are nearly at 100% full implementation of the BMPs. We need to consider moving toward monitoring a smaller sub-set of the roads and units.

The IDT recommends focusing on emphasis items rather than the specific rating for the BMP. The group feels that this trip should be a communication opportunity to discuss interpretation of implementation of the BMPs. The group does not feel that it is significant to focus on the specific ratings. The orientation of the group is toward interpretation and implementation rather than a rigorous inspection of detail.

Recommendations follow to change the monitoring process and monitoring form. Suggestions include that the IDT monitoring be accomplished in two trips by a smaller IDT team and a larger staff IDT group. The quality control monitoring should be completed by an IDT team, which is comprised of FS specialists, logging systems specialist, monitoring coordinator, and representatives from ADEC and FWS. This group should review units and roads selected through a stratified random process that examines the relatively same proportion of units harvested with particular logging systems as implemented. The weighted stratified weighted system should continue to emphasize the areas showing steeper slopes and Class I, II, III, & IV streams. The larger IDT group comprised of FS staff, FS specialists, monitoring coordinator, and representatives should review areas that illustrate implementation of new or controversial standards & guides, timber harvest and road construction sites during actual implementation of the best management practices and standards & guidelines.

Recommendations specific to the monitoring form include changing the monitoring rating system, simplifying the form and adding an additional bulleted item. The group recommends changing the rating system for the BMP Implementation to a system that indicates the percent full BMP implementation (i.e. rate with a 1-4 reflecting the degree of implementation) in addition to the fully implemented (Y), departure (D), not implemented (N) system. Simplify the form to require fewer entries. The IDT recommends providing specific guidelines on what constitutes a departure. Add a bullet for lakes under BMP12.6a Buffer Zone Design & Layout.

Other monitoring, inspection and functional assistance trips should be utilized to collect monitoring information and fill out monitoring forms. The other agency IDT group would not necessarily need to be involved with the entire 10 percent quality control sample. The timber sale inspection/ certification group and the monitoring effort should be related to complete this work in a time efficient manner and eliminate any duplication of efforts. Any district monitoring completed through district trips or regional office functional assistance trips should also be related and utilized for completion of some of this monitoring.

Appendix D

IMEG Monitoring 2000 Trip Report – Hoonah Ranger District

IMEG IDT Monitoring Trip Report

Hoonah Ranger District

August 22-24, 2000

A field trip to the Hoonah Ranger District, on August 22-24, 2000, was conducted as a part of the annual interagency Best Management Practices (BMP) Implementation/Effectiveness Monitoring effort. The purpose behind the Hoonah visit was to inspect culvert replacements to determine if the BMP was implemented correctly, and to determine the effectiveness of the BMP, as applied in a given instance.

Monitoring was conducted by Linda Speerstra (Alaska Department of Fish and Game), Timmie Mandish (U.S. Fish and Wildlife Service), Chris Meade (U.S. Environmental Protection Agency), Paul Matter (Hoonah District Ranger), Brian Heinrichsen (Hoonah District Engineer), Steve Paustian (Tongass National Forest Hydrologist), and Michael Fox (Tongass National Land Management Planner).

Background

A 1996 Regional Office activity review of Hoonah District system roads identified the need for further study on the effects of culvert design and maintenance on upstream migration. A monitoring project, funded through the Environmental Protection Agency, was initiated in 1997. The objectives of the monitoring project were: Identify physical conditions that impede fish migration at Class I and Class II stream crossings; sample fish above and below stream crossings and estimate area of potential habitat loss associated with road-related migration barriers; and identify maintenance needs and opportunities for restoring access to fish habitat.

Sampling was focused on road segments, identified in previous surveys, as having significant numbers of culverts that restrict upstream fish migration. These included segments of road in the Game Creek, Freshwater Creek, Iyouktug Creek and Pavlof River watersheds on Northwest Chichagof. A summary of the procedures and findings, titled *Fish Passage at Selected Culverts Crossings on the Hoonah District Road System*, was compiled by Chris Riley and Steve Paustian (3/99).

There were 32 stream crossings identified as potential barriers to fish migration. Of these, 13 were identified as Class I streams; all 13 were determined to present actual barriers to movement by adult and/or juvenile anadromous fish. The remaining 19 streams were classified as Class II (containing resident fish). Seventeen of these were determined to barriers to fish migration.

In 1998, plans were made to replace the culverts identified as fish barriers during the field survey. A contract was prepared, using the BMPs, TLMP Standards & Guidelines, and stream crossing construction specifications applicable at the time. The contract period was set to coincide with the “fish window” of June 1 – July 15. Full consultation with ADF&G was entered into, conforming to the conditions of the March 1998 Memorandum of Understanding on in-stream work.

The work under the contract involved removing the existing culvert, replacing it with one of the proper size, and assuring that it was installed to provide fish passage for adults and juvenals. To date, 39 culverts have been replaced under two different contracts, with work occurring in 1998, 1999, and 2000. Work has occurred in the Game Creek, Freshwater Creek, Iyouktug Creek, Pavlof River, and Neka River watersheds. Priorities were the problem barriers identified in the study, and the “worst of the worst” of culverts identified in subsequent surveys.

Implementation Monitoring

The purpose of the monitoring trip was to look at replacement culverts on existing road systems. The applicable Best Management Practices were 14.6 – Timing Restrictions for Construction Activities and 14.14/14.17 – Bridge/Culvert Design, Installation & Removal. The original culvert locations were determined during the initial road construction. The location was on what had been determined to be the break between Class I or II stream reaches, and the beginning of the Class III segments. This may or may not have been accurate.

Several of the culverts had been replaced over the life of the road; however, these replacement pipes did not meet the current criteria of allowing fish passage or for sizing.

The team looked at a total of 20 culvert replacements on four road systems in three large watersheds. The 20 culverts inspected represented 51% of all culverts replaced; the remaining 19 culverts were on road systems that were deemed impractical to access in the time allotted.

A complete stream survey was completed on one site (FR 8508, kp 20.10). The results of this survey will be available at a later date.

Of the 20 culverts investigated, four had departures from full BMP implementation, and required corrective action. In addition, three others were installed in compliance with the BMP, but may require some additional work or corrective action. The major problem, encountered during the 1999 work season, was the presence of abnormally high water flows. A combination of heavy snow accumulation, late snow melt, and heavy rains caused higher-than-normal runoff and stream flow during the "fish window" (June 1 – July 15). Removal of the culverts and the leveling (or bedding) resulted in the surrounding soil to become loosened, which, in turn, resulted in the washing out of the soil. This was a particular problem where the streambed was of alluvial origin, and in areas of very shallow bedrock. This washing sometimes resulted in the formation of headwalls upstream of the culvert. While it was recognized at the time as a problem, it was felt best to proceed during the "fish window", rather than to wait and possibly extend outside the window period. It has since been learned that waivers can be granted for in-stream work outside the window, so this will be a factor in future contracts/replacement work.

A second problem encountered was the use of "typical" installation designs where the site situation was atypical (shallow bedrock, steeper gradients, stream course shifting, differing stream gradient resulting from culvert removal, etc.).

In general, it was found that the replacement pipes were of the proper size for the stream width; there was good application of rock weirs for outlet control; culvert bedding was good, except in the case of 6%+ alluvial channels (excessive head cutting) and channels with shallow bedrock; and, timing of in-stream work conformed to the "fish window". In the last case, the BMP for timing was met, but high flows in June 1999 exacerbated erosion and headcutting, causing non-compliance with BMPs 14.14 and 14.17.

Sites where problems were identified, or it was determined that some follow-up was desired, will be revisited in the spring of 2001.

The following table lists the culverts where concerns were identified, and the departure from BMP implementation or problem identified with the installation.

Culvert Number	Departure/Problem	Corrective Action
Rd 8505, kp 20.90	Tried to implement a "typical" design on an "atypical" site. Although the culvert was placed in accordance with the BMP/S&Gs, it was not appropriate for the site. The original culvert was placed on the stream gradient (about 5%). The replacement culvert was placed on bedrock at about a 2% gradient. Upstream cutting resulted in a 1-foot head wall.	Corrective action includes bringing the streambed at the outlet up, placing boulders downstream to provide pool habitat, and placing rocks and gravel in the pipe to increase roughness and facilitate natural filling.
Rd 8508, kp BETWEEN 21.08 AND 22.46	There was some head cutting some 25 feet up stream of the culvert. The material filled in above the culvert, causing some rerouting of the stream channel to one side, resulting in some bank cutting to one side of the culvert.	It is believed the situation is self -correcting; however, inspection will be made in 2001, and if the stream has not self-corrected, remedial actions will be taken.
Rd 8513, kp 0.59	Shallow bedrock was not anticipated; this resulted in a culvert on a 4% gradient, rather than <1%. Upstream cutting occurred during culvert replacement, causing a short, steep stretch, cut to bedrock.	Corrective action is rock placement in the culvert to increase roughness, encouraging and enhancing gravel fill-in of the culvert.
Rd 8513, kp 1.52	Tried to implement a "typical" design on an "atypical" site. S&Gs in place at the time of contract prep, lead to the use of a standard design and specification. The stream was a steeper gradient, alluvial channel, and did not lend itself to a "typical" installation.	Corrective action includes boulder placement at the outlet to create a pool, and remedial work such as armoring on the upstream side to prevent bank cutting, relief of the headwall caused by upstream cutting, and placement of rocks and gravel in the pipe. Some problems may be self-correcting over time.
Rd 8513, kp 2.33	The culvert was aligned with what was thought to be the main stem at the time. Either a second stream turned out to be the dominant stream, or the original stream rerouted into the second channel during the winter. This resulted in a culvert that was not directly aligned with the stream, which enters the culvert at an angle. Effects are the cutting of materials from the road fill from around the pipe, and from the adjoining stream bank. In addition, the constructed pools downstream from the culvert have filled in with fine materials.	Corrective actions include the riprapping of the fill slope and stream bank to prevent further cutting, boulder placement upstream to help direct the stream into the culvert, and additional boulder placement downstream to improve the pools.
Rd 8534, kp CULVERT #3	The culvert was placed in accordance with the BMP/S&Gs; however, cutting of the streambed between removal of the old pipe and installation of the new, as well as post-installation washing of the alluvial soils, have created downstream access problems.	Additional step-pool construction is required to correct the downstream access problems.
Rd 8534, kp CULVERT #2	Severe washing of alluvial soils after the original culvert was removed and the replacement culvert installed resulted in the streambed being approximately 3 feet lower than the original streambed location. This resulted in upstream cutting, leaving a 1+-foot headwall barrier.	Because of the streambed material, it is believed the barrier will be self-correcting. If the barrier does not self correct in 1-2 years, action will be taken to "smooth out" the barrier manually.

Results and Recommendations

The overall results were very good; however, some problem areas were identified, including two culverts that would not pass juvenile fish. The majority of the culverts were correctly installed, functioning well, and presented no problem. Approximately 20% of the culvert replacements inspected were generally installed in accordance with the Best Management Practice(s) but had less than desirable results. Primary departure from the BMPs was the use of a "typical" design criteria/standards in atypical situations/conditions. Two culverts failed to provide passage for all life stages; however, passage for adult fish was possible.

A set of recommendations resulting from this monitoring is listed below. These include recommendations of measures to be applied to all culvert replacements, and to specific atypical situations or circumstances.

General recommendations, to apply to all future culvert replacements include:

1. Prioritize future culvert replacements based on watershed assessment and Access Travel Management/Road Condition Survey assessment results. (**High Priority**)

2. Complete a detailed site design survey on all difficult sites (gradients greater than 7% and stream widths greater than 3 meters).

3. Recreate the original stream grade (stream simulation) to prevent both upstream and downstream washing and cutting, and to facilitate fish passage.

4. Design standards for culvert gradients of more than 3% require the use of non-standard designs. The standards in the Interim Standards and Guidelines for Fish Passage Culvert Installations give greater flexibility in culvert design and installation. Use these S&Gs for future culvert replacements. (**Highest Priority**)

5. When necessary, use rock placements or some other mechanical "roughness" in culverts of less than 1% gradient to facilitate gravel catchment.

6. Wait one full winter before assessing substrate in culverts. Less than one full winter's runoff may not result in a good indication of gravel fill-in in the culverts.

7. There is a need for better criteria for resident fish passage; existing criteria are interim and a stopgap at best; full development of good S&Gs for resident fish is needed. This may require an administrative study. (**High Priority**)

8. Complete a habitat survey, both upstream and down. Ascertain if there are downstream barriers preventing fish passage to the site, and determine amount of additional habitat to be gained upstream. (**High Priority**)

Site-specific recommendations to apply to specific problem areas or situations include:

1. The primary problems were generally found on sites with alluvial soils, and were related to problems encountered during the 1999 work season, a period of abnormally high water flows during the spring and summer. A combination of heavy snow accumulation, late snow melt, and heavy rains caused higher-than-normal runoff and stream flow during the "fish window" (June 1 – July 15). Removal of the culverts and the leveling (or bedding) for the new pipe resulted in the surrounding soil to become loosened, which, in turn, resulted in the washing out of the soil. This resulted in changing of the streambed gradient/contour, up- and downstream cutting, and/or filling-in of downstream pools.

   It is recommended that, should similar circumstances occur in the future, work be delayed until conditions improve. If the time frame extends beyond the "fish window", waivers can be obtained for in-stream work. (**High Priority**)

Should these conditions occur, additional recommended measures include the use of upstream riprap check dams before removing the old culvert to prevent upstream headwall cutting, the use of filtercloth "dams" downstream for sediment/debris control, and the re-creation of the original stream grade before it was "hydrauliced" out with the old culvert placement/ removal in order to prevent up- and downstream washing and cutting.

2. The second major problem was the unexpected shallow depth to bedrock at several sites. The severe washing encountered in 1999, as well as culvert removal activities, exposed the bedrock, and changed the gradient of the natural streambed. When the "typical" installation was attempted, it led to problems in bedding, or was at a gradient less than that of the stream course.

   Recommended mitigation or preventative measures include more reconnaissance for bedrock control and bank exposure (including test pits), and the use of non-typical or special design criteria for the replacement culvert (*see General Recommendation 4. above*).

3. A third problem, unrelated to the culvert replacement itself, has to do with the effectiveness of the activity. While habitat surveys were completed, many culvert replacements resulted in a very short stretch of additional habitat being made available. The District estimates that an average of approximately 220 feet of additional available habitat was obtained with all culvert replacements. However, at least three of the sites inspected had significant barriers within 50 feet upstream, and in two cases, there were significant barriers immediately downstream. While the culvert replacement may have conformed to the BMPs, and fish passage fully facilitated, the effectiveness of the replacement was slight to nil, and leads to little or no contribution to increased upstream habitat.

   The recommended measure to prevent this situation is a good habitat survey up- and down stream of the culvert site. This will allow the use of limited resources in locations where the "biggest bang for the buck" can be obtained by focusing on the highest priorities first. (*See General Recommendation 8. above.*) **(High Priority)**

☆ U.S. GOVERNMENT PRINTING OFFICE: 2000 — 689-080 / 10053 Region No. 10

Federal Recycling Program
Printed on Recycled Paper

Tongass National Forest
USDA Forest Service
Ketchikan Supervisor's Office
Federal Building
648 Mission Street
Ketchikan, Alaska 99901
OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

PRIORITY MAIL
POSTAGE & FEES PAID
USDA F.S. / JUNEAU, AK
PERMIT NO. G-40

Current Serial Records Room 002
USDA Agricultural Research Service
National Agricultural Library
10301 Baltimore Ave.
Beltsville, MD 20705-2351